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"What is the Use of an Assessor?"

THE above question seems, from correspondence we have recently had, to be rankling a good deal in the minds of members of the architectural profession at present. The particular kind of assessor referred to is, of course, the professional adviser who is now frequently asked to "advise," "assist," or "adjudicate" in regard to the award of premiums in architectural competitions. The increasing number of cases of late in which it has become known that the committee or promoters of a competition, having engaged a professional assessor, threw over his award and gave the premium to another competitor, certainly give considerable point to the question, though the matter is not by any means so simple a one as some architects appear to think.

The appointment of a professional adviser to competition committees has become tolerably general of late, in consequence of the action taken a few years since by a considerable number of the profession in signing a mutual agreement not to enter into any competition unless a professional adviser was appointed. This signed understanding, which we believe has been loyally acted upon by most of the signatories thereto, has had a practical result beyond what was expected in leading or compelling competition committees to appoint professional advisers. In a number of cases, after a competition is advertised, the committee receive letters from various architects, stating that they would be happy to compete, but that they are under an undertaking not to do so unless an assessor is appointed; and the committee, even if they are inclined to be recusant in the matter, probably find practically that they can hardly have a competition worth having unless they accede to the demands of the architects. It may be observed that expostulations and recommendations in the same direction were long tried on committees, with no avail. In the *Builder* for April 13th, 1884, we printed the "Suggestions for the Conduct of Architectural Competitions," drawn up and formally approved by the Institute of Architects, and which were to a great extent directed to this question of the advisability of appointing a professional assessor; and copies of these Suggestions were, we believe, officially forwarded in many cases to committees engaged in the promotion of competitions. But little or no effect was produced until a number of the architects "struck" for an assessor. Then the public gave in, and since then it is not uncommon to see in the advertisements inviting competitions the statement that "a professional assessor will be appointed to assist the committee in coming to a decision;" and in some cases this has no doubt been a *bonâ-fide* announcement, which has been acted upon in good faith, and the selection has been made in accordance with the assessor's judgment. But less scrupulous committees have lately discovered that though they may be obliged to appoint an assessor in order to satisfy the prejudices of architects, they are not obliged to act upon his award. Accordingly they engage the assessor, hear his judgment, and then set it on one side in favour of the design they like best, or of the candidate they are determined to favour; and then, say the competing architects, how are we any better off than before? And "what is the use of the assessor"?

The idea with those who make this complaint appears to be that the assessor should simply make the award, and the committee accept his judgment as final. That opinion has been distinctly expressed in letters that have been written to us, and some architects appear to think that for the committee to act otherwise is a breach of good faith. Now, we are desirous to consider the subject not from a one-sided view, as the mere advocates of the architects, but as impartial arbitrators between the architects and the public. And from this point of view we must say that, if the architectural profession expect, as some of them evidently do (we do not by any means believe that they all share this view), that all committees promoting competitions are to give up their own ideas and preferences entirely, and put themselves blindfold into the hands of a professional adviser to choose a design for them, they are expecting more than is reasonable, more than the public will grant, and more than their own leading official body has ever thought of asking for. The "Suggestions" of the Institute, before referred to, though including in the first instance the rather ambiguous phrase that the decisions of the assessor or assessors "should govern the selection of the designs in all stages of the competition," obviously were not intended to enforce the principle that the assessor should override the committee entirely, for in the sub-clauses further defining the duties of the assessor we read, "to advise the promoters on the relative merits of the designs submitted in competition;" a phraseology which obviously leaves it open to the promoters to adopt their own course if they think proper. The undertaking entered into by the architects who, a year or so later, signed an agreement not to enter into competitions unless an assessor were appointed, ran thus,—"unless one or more professional assessors of established reputation are appointed to advise the promoters on the relative merit of the designs submitted in competition:" and this wording also is elastic, and does not propose anything more than advice. If it was the desire of the architectural profession that in all competitions the decision should be taken out of the hands of a non-professional committee, and put into the hands of a professional assessor, they should have so worded the undertaking which was signed by so many of the profession. They might then have obtained those conditions; but they would not have obtained them without a good deal of opposition on the part of the public, and probably some opposition on the part of members of their own body. Some of the latter would say, and have said, that on the whole they would rather trust to the average judgment of a committee representing various opinions, and in which various sides of the question would be discussed, than to that of one man, though a man of professional knowledge, who might have his own prejudices and fancies very strongly developed; we have even heard it urged that favouritism and partiality would be less likely to have free play in a Committee than if the decision was left to one man without appeal. On the other hand, the public would object, and with considerable show of reason, that the people who wanted a building, and were going to pay for it, had a right to the final exercise of their own taste and opinion, however much of good advice they might be ready to listen to; and it would be very difficult to persuade the public generally that this was not a reasonable and natural position to assume.

As to the objection from the architectural side to the absolute rule of the assessor (an objection only made, we imagine, by a very small minority of the profession), we do not think there is any

ground for the idea that the professional assessor is likely to be more prone to personal partialities than the Committee. As far as we have been able to form any idea, we should say that the duty of professional assessor in competitions, since it has become common to appoint such an assessor, has been in general performed with most praiseworthy and judicial impartiality. We can only recall one case of importance in which any suggestion to the contrary was made by the competitors. In regard to architectural style, indeed, a single architect acting as assessor probably will have his favourite ideas about style, but we do not know that he is likely to differ from most non-professional committee-men in this, except that he will have a reason to give for his opinion, and the committee-man probably will not. And we can recall more than one case in which an assessor has decided in obvious opposition to his known tastes in regard to style, from the conviction that plan ought to be first considered, and that the best plan was obvious. On the whole, we believe that final and despotic power given to the professional assessor would afford no just cause of complaint to competitors; indeed, it is what the majority of them seem to wish for. But would it be altogether fair to the promoters of competitions? For they too, it must be remembered, have their rights, and they may say "The professional assessor may tell us that such a design is the best of the set, but it is we who are going to pay for the building and to use it; even a professional assessor is not infallible; he may be mistaken, or, if he is not, we may like another design better, and why are we not to purchase what we like with our own money?" To the public mind the argument becomes stronger when it is remembered that they have to fee the assessor, and one committee, we remember, put the case plainly in so many words—"When we have made up our own minds, why should we pay another man for his opinion?"

The answer to this lies in the peculiar position in which competing architects are placed. They are invited to exhibit their talents in designing and planning a building for certain specified requirements, on the tacit understanding that the best man wins. If the prizes in competitions are in a large number of cases given to designs which are not the best, the really able man who has produced a better design feels that his time and talents have been unfairly wasted; he ought on his merits to have won, and instead of the competition affording him a chance of getting the reward of his abilities, he is worse off than if the promoters had gone to the inferior man at once; he has spent his strength for nought, and his labour for that which is not bread. The only rational defence of the competition system is that it is supposed to be a means of getting the best building, and that it affords an opportunity to unknown men of ability to make themselves known. Now, the position of the architects is that, granting the honest intention of the promoters, they, in most cases, are not good judges of architectural design or of plan as exhibited in drawings, and that it is desirable, in fairness to all parties, that their judgment should be assisted by that of someone accustomed to the study of style and plan as exhibited in drawings. There can be no doubt that in most cases it is to the interest of the promoters themselves to be thus professionally advised; and we believe it will be found that most competition committees who have been honestly desirous of getting the best result have practically admitted this, and that while feeling free to select another design at their pleasure, they have usually elected to abide by the recommendation of their assessor, as the safest course.

In the case, therefore, of honest committees, we may say that the system by which the assessor is engaged as an adviser merely has worked, and does work, satisfactorily in the interest of the architects. But what are we to say of the case of dishonest committees, who nominally engage an assessor to satisfy the requirements of the architects, and then throw over his decision and select an inferior man from motives of favouritism? Some of our correspondents argue, from such cases, that an assessor without despotic power is a mere sham. The fact is, however, that where the promoters of a competition are not honest in intention they will contrive to evade any conditions, and we do not believe the profession would be wise to endeavour to take away all power of choice from the promoters of competitions, and put it unreservedly in the hands of the assessor, because some committees refuse to act on his advice. They would encounter much public opposition, not all of it unreasonable, and would perhaps not attain the desired end after all. It may be desirable in special cases to endeavour to extract from a committee an undertaking to abide by the decision of the assessor; but in the main the case is better provided for in the "Suggestions" of the Institute, which recommend that the plans should be exhibited, and that the decision or report of the assessor should be published. If this were done in any case in which the committee had reversed the decision of the assessor, public opinion would be brought to bear upon any unfair dealing, and committees who were disposed to favouritism would soon learn that it was not advisable to fly in the face of public opinion; and as the assessor has his own report in his own power, it is possible for him to see to its publication, even if the committee do not do their duty in this respect.

Those who ask, "What is the use of an assessor?" merely because his decision is not absolute or binding, forget also that a very important portion of the duty of an assessor, as contemplated in the Institute "Suggestions," is to assist in preparing the conditions and instructions to competitors. This is a very important matter to the profession, quite independently of the decision on the designs, as in many cases instructions drawn up without professional assistance are loosely worded and consequently not properly intelligible, or they do not give all the information required, or they make requirements as to scale and number of drawings which are quite unnecessary and unfair to the competitors. It is unfortunate that in too many cases the advisability of appointing an assessor at all is not brought home to the promoters until after the instructions are drawn out and the competition advertised; but where the appointment of the assessor to draw up the instructions can be secured, his services in this capacity may be very important indeed, and save the competitors much inconvenience and waste of labour, inflicted on them often by committees in pure ignorance of the conditions and requirements of architectural work.

It is, therefore, we think, a mistake for architects to cry out: "What is the use of an assessor?" merely because adjudication of the assessor cannot be, or has not been hitherto in most cases, made obligatory upon the promoters of a competition. In the majority of the more important competitions in which a professional assessor has been appointed, his judgment has been accepted by the promoters; and even where it has not been finally accepted, it is probable that the committee have known more about the matter through his assistance, and perhaps made a better choice than they would have made without it, supposing them to have had honest intentions. When a committee has not honest intentions, and gives a manifestly wrong award through favouritism or private interest, the publication of the assessor's report, which ought to be made a condition of the competition, would be an influence that would soon avail to bring committees to reason, more especially in the case of competitions for public buildings to be provided out of public funds. In such a case the committee are manifestly bound to procure the best building they can, and fail in a public duty if they do not aim at this. A private committee for building a church or a bank may have more colour for urging that they have a right to consult their own tastes and not those of the assessor, though even here the question of justice to the competing architects must by no means be forgotten; but when a corporation or a vestry conducting a competition are told distinctly by a competent man that such a plan is decidedly the best, and throw it over in favour of an inferior one by somebody whose interests they wish to promote, they are playing false with a public trust, and if the assessor's report and his reasons for his choice were published, so as to place the whole job in the light of day, the ratepayers would soon make things unpleasant for the jobbers; and that is the reason why, in such cases, there is usually such a determined objection to publishing the assessor's report.

The actual adjudication and award of the premiums by the professional assessor is, however, a possible solution of the question, though, as we have said, it is one the general adoption of which would probably be opposed by the public. Some of our correspondents, who have assumed that it was the manifest duty of committees to accept the assessor's adjudication, have probably been misled by the fact that in several prominent and important competitions of late years the promoters have accepted the assessor's award without question, because they thought it the wisest thing to do, not because they were pledged to it. In the case of the Birmingham Law Courts the Corporation adopted Mr. Waterhouse's award, but clearly without thinking themselves pledged to do so, as the question of adopting it was the subject of some little discussion. In other cases similar awards have been adopted without any discussion, but equally as a matter of choice, not of necessity. But as there is at present some uncertainty and difference of opinion as to what are the powers of an assessor in a competition, whoever is asked to undertake that responsible office ought first to obtain a precise statement in writing from the promoters as to what they are asking him to do. There are three ways in which he may act for them. (1) He may award the premiums absolutely, as their representative. (2) He may select the designs which he considers most deserving of the premiums, giving his reasons for the selection, but leaving it to the promoters to adopt his recommendation or not. This is the course most usually followed. Or (3) he may assist their judgment by a general review of the good and bad points of the plans, and leave them to form their own judgment with the assistance of the light thrown on the matter by his professional criticism; and where the promoters are men of sense and mean honestly, it may be that this is the fairest way of all, as the promoters then get the general insight given by the professional assessor's report, without leaving to his single judgment the absolute selection of any special design. But the promoters ought to furnish the assessor with a distinct statement as to which of these courses they intend to pursue, and if it be the first, they ought to give a distinct undertaking to abide by his award; and they ought, with equal distinctness, to inform the competitors whether they intend the assessor to make the award, or whether they reserve the right of making it themselves with the assistance of his information and criticism. Then competitors will know how they stand, and will have no right to make complaints afterwards.

There is one more duty that must be mentioned in regard to competitions—a duty incumbent upon the architects—viz., that they should accept loyally the award when there is no reason to suppose it has been made in any but a fair spirit. We regret to be obliged to think that there is in the profession a great want of the spirit of loyalty and chivalry in these matters. In the smaller competitions we should say that in two cases out of three no sooner is the decision announced than some of the competitors get up a movement to endeavour to upset it, and this even in cases where there has been no manifest or obvious bad faith; and, unfortunately, this kind of spirit is not confined to smaller competitions and to the rank and file of the profession. We see cases where eminent men are concerned, where an assessor whose ability and good

faith no one could question has been appointed, and where attempts have been immediately made to upset his award, on no pretence that it was corruptly given, but simply because the unsuccessful men would not rest satisfied. That is not the way to maintain the dignity of the profession in the eyes of the public. To demand the appointment of a professional assessor, and then to try to get his judgment set aside when it is against yourself, is a line of conduct which might be most properly described in the dictum of the fashionable woman in *Punch*—"It is worse than wicked; it is vulgar."

RIVER IMPROVEMENTS IN IRELAND.

THE four gentlemen who were appointed in 1886 a Royal Commission to report upon what public works in Ireland would be desirable and practicable, are now proposed to be constituted a Commission to carry out what they recommended in 1887, that is, works of arterial drainage within the watershed areas or the catchment areas of the rivers Bann and Barrow. They are to define the catchment area of each of these two rivers; to draw up a scheme for the election of a Conservancy Board in each area, and to lay before each Conservancy Board, when constituted, the plans of the works, and the particulars of the lands which will be specially benefitted,—for the general plan is to divide these from all other lands,—also an estimate of the amount of contribution by the occupiers of those lands, and by the baronies and town lands, which the Commission are of opinion ought to contribute as being within the catchment area of the river; and generally to put the Conservancy Board in possession of the information requisite to enable them to decide whether the works are to be undertaken. The Conservancy Board will consist of persons nominated by the Board of Guardians within the catchment area, of persons elected by the occupiers of lands which will be specially charged, and of persons representing the towns within the same area,—those which have Town Commissioners, —together with one representative of Government, who is to be a member of the Board, but is not to have a vote. The persons elected by the occupiers of lands specially charged are to constitute three-fourths of the Board. This Conservancy Board may reject the scheme proposed by the Commission; if so, another Conservancy Board is to be elected; if the new Board also rejects the scheme it is to be given up; but if the Conservancy Board, representing the several interests mentioned, are in favour of the works being proceeded with, the Commission may execute them. The money is to be supplied from time to time by the Government, partly by way of loan, repayable in instalments with interest, extending over forty years, and partly as a free grant from moneys voted by Parliament.

In the case of the Shannon drainage, the recommendations of the Royal Commission of 1886 are to be carried out by the existing Commissioners of Public Works in Ireland, but it is proposed that the works shall not be undertaken unless with the assent of the occupiers of the lands specially benefitted, who will be charged according to the value of the benefit received; and of the occupiers of the rest of the lands in the catchment area, who will be charged according to the grand jury cess. The voting power of the benefitted area is to be estimated as equivalent to three times the voting power of the rest of the catchment area, and each fraction of the voting power of the benefitted area is to be in like manner equivalent to three times the same fraction of the voting power of the rest of the catchment area.

Of the comparative areas to be dealt with by the three Bills in Parliament, that of the Shannon is between two and three million acres—nearly three—above the tideway of the river near Limerick. The chief features of this basin are the large area of flat land in its middle portion, and its rapid descent in the lower portion. In the fifteen miles from Limerick to Killaloe the rise is 97 ft. In the 125 miles from Killaloe to the uppermost lake, Lough Allen, it is 46 ft., and this is nearly uniformly distributed, being at the rate of only 4 in. or 5 in. per mile—much the longest river in the kingdom with so little fall.

In the year 1831, when the Commissioners of Public Works in Ireland were first constituted, a special Commission was appointed by Government for the improvement of the Shannon, in respect of both navigation and drainage, of which Mr. T. Rhodes was the engineer member. A complete scheme for dealing with the river was designed by Mr. Rhodes and his colleagues, the execution of which was undertaken in 1839, and consisted of deepening the channel, rebuilding bridges, removing obstructive mills and eel-weirs, and reconstructing and enlarging the locks in the middle portion of the river, with the result of providing a greatly-improved waterway through the most important parts of its course, and of improving the drainage of 34,700 acres of land, 13,200 of which were altogether relieved from floods, the duration of floods over the rest of the area being much diminished. The Irish Board of Works assumed charge of these works in 1846, nominally, but not actually until 1852, when the Shannon Commission ceased to make separate reports. In 1861 a flood of unusual magnitude led to complaints by the riparian proprietors, and the Government directed Mr. Bateman, C.E., to examine the river, and report as to the works necessary for relieving the lands from the effect of a flood equal to that of 1861, without injury to the navigation. Having examined the river, Mr. Bateman reported in 1863, and again in 1867, under further instructions, and furnished complete working drawings and estimates of all the works required. Sluices were to be constructed in the solid weirs built by the Shannon Commissioners, and improvements and enlargements of the channel were to be made in many places, and Lough Allen was to be utilised as an impounding reservoir; but the Parliamentary powers for carrying out the scheme lapsed before anything was done. In 1879-80, however, the question was again mooted, and it was decided to carry out part of Mr. Bateman's design, to the extent of inserting sluices in the existing weirs, and the formation of a new channel in one part of the river, these works being carried out in 1880–82. This partial application of the design, however, seems to have had but a limited success, and Mr. Manning, the engineer to the Board of Works, said from the first that that would be so, and that such works could not result in complete control of the floods, which could only be accomplished by excavations in certain portions of the river bed. According to the evidence of Mr. Bateman before the Royal Commission last year respecting his instructions in 1863 and 1867, his object in proposing to excavate the river bed was to get rid of the flood waters without injuring the navigation. The enlargement of the river which was necessary for the purpose of carrying off the flood waters enlarged by so much the capacity of the river for navigation. With regard to the partial carrying out of a design, the evidence is to the effect that it may do more harm than good, because it tempts people to till the ground and cultivate crops which could not previously be cultivated, and when a flood does arise the state of things is worse than before.

Draining, as it does, so large a portion of Ireland, and being the outlet of several other important rivers, the Shannon occupies an exceptional position, and the Royal Commission, on whose report the three Bills recently introduced in the House of Commons by the Irish Chief Secretary are founded, advised that in the case of this river no new Conservancy Board need be appointed, as in the case of the other two rivers, but that it remain in the care of the Commissioners of Public Works, who should, while maintaining the navigation, regulate the depth of water with a view primarily to the drainage of the country. Above Athlone, however, it is proposed that the navigation be abandoned. The recommendations of the Royal Commission had reference to the main river only, in the case of the Shannon, the conservancy of the larger tributaries being constituted separately; but in the Bill no distinction is made. The estimated cost of the works authorised by the Bill within the catchment area of the River Shannon is 230,000*l.*, of which it is estimated that 35,000*l.* can be charged upon the lands specially benefitted, in the form of an annual charge of 4*l.* 10s. for every 100*l.* advanced by Government, payable for a term of forty years. This charge for capital expenditure is estimated at 1,575*l.* per annum, and will begin to be payable when the whole of the advances have been made. The maintenance charges upon the specially-benefitted lands will be about 1,575*l.* per annum, making in all a charge of 3,150*l.*

It is proposed to charge 65,000*l.* upon the county cess of the baronies and town-lands within the catchment area of the river, payable by a similar charge, to be presented by the grand juries at each assizes. The share of the maintenance charge on the catchment area is about 2,675*l.* per annum, which, with the charge for the capital outlay, will require an addition of a penny in the pound to the grand jury cess in the catchment area. A sum of 65,000*l.* is to be raised by a mortgage of property connected with the river and belonging to the Government, and the residue of the cost of the works, not exceeding 65,000*l.*, is to be supplied as a free grant from moneys voted by Parliament; but it is not proposed that the works shall be undertaken without the consent of the persons chargeable, as we have mentioned, the increased voting power of the occupiers of the lands to be benefitted being, as we have also mentioned, three times as great as that of the occupiers of the rest of the catchment area, which is to be defined by the Lord-Lieutenant within the counties of Cavan, Leitrim, Roscommon, Longford, Galway, Westmeath, King's County, Tipperary, and Clare; and this area, when so defined, will be the contributory area for arterial drainage purposes.

On the Barrow, the area to be dealt with is one of 408,000 acres in the upper part of the river basin, above Athy, reaching from that place to the watershed all round to the west, north, and east. This catchment area is flat. As a drainage district it is one of the most important in Ireland, whether in respect of its position and attendant circumstances, or the extent of its area and of the lands flooded. But effectual drainage has never yet been accomplished, although at various times since 1847 it has been under consideration, and two portions of it have been dealt with, viz., the Rathangan district of 41,488 acres, and the Kildare district of 15,878 acres; but the chief and most difficult portion of 350,000 acres remains to be done. This upper portion of 408,000 acres cannot be effectually drained without going twelve miles further down the river to Carlow, for this length of river holds up the water and prevents the free escape of floods from the large area above Athy. It has plenty of fall—perhaps 2 ft. or 3 ft. per mile all the way to Carlow—but its average depth is, perhaps, not more than 3 ft., with a width of from 110 ft. to 150 ft. It is navigable by means of locks, of which there are five in the 12 miles; but it has a hard bottom, and this seems to be the real obstacle to all former attempts to provide an outlet for the floods of the large area above Athy, which are estimated to amount to 320,000 cubic ft. per minute as a maximum, and as this large body of water cannot get away from the rim of the basin, it floods 46,000 acres of land, extending for miles upwards along the river and all its tributaries. The construction of sluices in the existing solid weirs in this length of river is one of the works proposed, to facilitate the passage of flood waters, but unless the river be deepened, at least in the upper part of this 12-mile length, it would appear that the sluices would not have the effect of lowering the flood waters without destroying the navigation. The lowering of

the hard bottom of the river would be an expensive work, probably, but it was recommended by several of the witnesses. The amount proposed to be expended on the Barrow drainage is 360,000*l.*, of which 125,000*l.* is to be charged upon lands for the special benefit of which the works are designed, the charge being 4*l.* 10s. for every 100*l.* advanced by Government, payable for a term of forty years, and amounting to 5,625*l.* per annum. The annual maintenance charge upon these same lands will come to about 3,475*l.*, making in all an annual charge of 9,100*l.* Then 20,000*l.* is to be charged upon the county cess of those baronies and townlands which are situated within the catchment area, payable by a like charge. The share of the maintenance charges to be paid out of the county cess will be 600*l.* a year, and it is estimated that an addition of about a penny in the pound on the valuation of the lands and buildings within the catchment area will be sufficient to meet it. The residue of the cost of the works will be supplied—not exceeding 215,000*l.*—as a free grant from moneys voted by Parliament.

On the Bann, a great deal has already been done. The works were executed between 1847 and 1861, at a cost of 264,000*l.*, of which 109,000*l.* was a grant from Parliament. The objects aimed at were the drainage of the basin of the river and the provision of a navigable channel from Lough Neagh, near the centre of the river basin, to the tideway at Coleraine. Great benefits resulted from the drainage works, especially during the first ten years after their completion, both above and below the central lake, but the navigation of the lower length of the river has not paid as a commercial speculation; there is a railway on each side of it. The cause of the flooding of land of late years is partly due to the neglect to maintain this lower portion of the river in as good a condition as it was when completed and handed over to the Navigation Trustees in 1859, and it is proposed to charge upon the trustees of the navigation the cost of removing the obstructions. The works to be undertaken on the Bann are estimated at 65,000*l.*, of which it is proposed to charge 8,000*l.* upon lands specially benefited; 37,000*l.* upon the county cess of baronies and townlands within the catchment area; and the residue, 20,000*l.*, as a free grant from moneys voted by Parliament.

NOTES.

WE reprint in another column the *Times'* Report of a meeting held on Monday last in the Board-room of the City of London Union, to consider the possibility of rendering workhouse administration subservient to the education and training of able-bodied men in country pursuits. As will be seen from the report of the meeting, the idea of the Rev. S. A. Barnett, who moved the principal resolution, was to qualify men who could not find work in trade for working on land; in fact, to take labour to land that wants it; an idea which we have before strongly advocated. As will be seen from the report, a resolution in favour of the formation of a Committee to inquire into the practicability of thus applying surplus labour to unproductive land at home and in the colonies was carried by a large majority. We hope more will be heard of this proposal, which is at least well worth serious and prompt consideration.

THE case of "Croft *v.* The Rickmansworth Highway Board," which has been heard on appeal before the Lords Justices Cotton, Fry, and Lopes, with the result of a reversal of the previous judgment for the defendants, is of importance as a precedent in regard to the legal definition of a "drain," as used in section 67 of the Highway Act. The plaintiff was the owner of a house and grounds near Rickmansworth, on which grounds was a "dumb well," as it is rather absurdly termed, into which, at some period not clearly ascertained, the surface-water from the upper part of the adjoining land had been conveyed in pipes, and left to percolate through the subsoil. In 1882 the Watford Board cleaned out this well, and substituted 9 in. pipes for the old 6 in. ones. The plaintiff objected to this, and when the Watford Board was dissolved, in 1884, he stopped up the well; but the Rickmansworth Highway Board, which succeeded to the jurisdiction of the Watford Board in 1885, re-laid the pipes and re-opened the well. The plaintiff's contention was that the terms of the Highway Act, under which the Board would be empowered to make and keep open "all ditches, gutters, drains, or watercourses," did not empower the Board to meddle with a well. The original judicial decision to the contrary is obviously in accordance with the spirit of the law. The so-called "well" in this case is not a well in the true sense, but a vertical drain, the term "well" being merely an ambiguity of language. The judges on appeal, however, have decided otherwise, and that such a well is not a drain within the meaning of the Act; a decision apparently more in accordance with the letter than the spirit of the Act referred to.

TUNISIA is something like a French colony. According to a recent report of Consul-General Playfair, European enterprise is opening it in every direction, and a traveller will not find anything to interfere with his progress. A careful study has been made of and a system of conservancy commenced in regard to the ancient monuments with which the country is covered. A public library has been provided and a museum opened in the ancient Hareem of the Bardo; the French civil and military officers throughout the country have united their efforts to those of better-known archæologists for the purpose of collecting and preserving the antiquities which have been brought to light. The ecclesiastics, under the direction of the eminent Cardinal Lavigerie, have established a local museum on the site of the Byrsa at Carthage, and there is no more fear that acts of vandalism can ever be repeated. The native industries are few and in decadence. The wonderful plaster geometric tracery for which the Tunisians became so celebrated after the expulsion of the Moors from Spain may be almost regarded as a lost art, there being but few who can do this work at all, and none who can equal what was executed only fifty years ago. The same may be said respecting the exquisite Moorish tiles for which Tunis was once so celebrated, and which may be seen in perfection in the Dar-el-Bey, or town palace. There is only one man who continues to make them; he still retains the old tradition as regards colour and design, but the quality of the materials is no longer what it used to be, and every tile is marked with those unsightly blotches caused by the crows' feet which he uses to separate them during the process of baking. Pottery is made at Nebeul, still of elegant form, possessing a beautiful green and yellow glaze—the tradition, no doubt, of Roman art.

SUBJECT to fuller advertisement, and deposit of statement and schedule of graves (under the Open Spaces Act, 1887) with the Holborn Local Board, Dr. Tristram, Chancellor of the London Diocese, has consented to issue, in October next, his faculty for laying out as a public garden the disused burial-ground, — situated in St. Pancras parish,—that appertains to St. George the Martyr, Holborn. The rector and churchwardens of that church, together with the St. Pancras Vestry, preferred their petition, in terms of the Metropolitan Open Spaces Act of 1881, in the Consistory Court on Friday, July 20th current. The burial-ground in question was established, immediately northwards of the Foundling Hospital, in virtue of 10 Anne, cap. 11. It was finally closed against interments in 1853. Here was buried, in her husband's grave, Anna, sixth and favourite daughter of Richard Cromwell. She was born at Hursley Park, near Winchester (her mother's inheritance), on March 27th, 1659, during her father's brief Protectorate, be it observed; and, having married June 19th, 1698, Dr. Thomas Gibson, Physician-General to the Forces, died, *s.p.*, in Bedford-row, on December 7th, 1727. The tomb may yet be identified by the carved arms which it bears of Cromwell and Gibson, per pale. About twelve months ago a committee was formed, with Mr. Butterfield as architect, for the restoration of the conspicuous monument bearing a Latin epitaph by Bishop Smalridge, which was erected in 1715 over the grave of Robert Nelson, author of "Fasts and Festivals of the Church." He, it is said, was the first to have been buried here, and with the idea of removing a violent prejudice that had arisen against the use of the ground. In the parish register of burials is the entry: "1714, January 28. Robert Nelson, Esq., of Gloucester-street. *Vir Insignis.*" Here, too, were interred Zachary, father to Lord Macaulay; Jonathan Richardson, the painter (1771); and Dr. John Campbell (1775), editor of "The Biographia Britannica" and "The Lives of the Admirals." Within this area was held a quasi-public dissecting school, the last of its kind in London. With this burial-ground is often confounded the adjoining graveyard, of about one acre and a half, which belongs to the parish of St. George, Bloomsbury, as taken out of St. Giles-in-the-Fields in 1730. It was opened to the public, under auspices of the Kyrle Society and the Metropolitan Public Gardens Association, on July 1, 1884, by H.R.H. the Marchioness of Lorne.

THE case of Burstal *v.* Hawksley, tried before the Lord Chief Justice on Tuesday, turned on one of those disputes about professional charges which from time to time serve to illustrate the importance of having a clear understanding about everybody's position beforehand. The action was brought by Mr. Burstal, who had been resident engineer for the Oxford Corporation when the new filter waterworks were constructed, to recover 284*l.* from Mr. Hawksley, the well-known engineer, as two-fifths of the commission paid to Mr. Hawksley as engineer-in-chief, and which the plaintiff claimed as his share as engineer "jointly" with Mr. Hawksley. The case of the defendant, whose counsel disclaimed on his part any desire to contest the matter on mere money considerations, was that such a claim was opposed to the whole practice of the profession; that an engineer-in-chief had the whole responsibility and the commission, and a resident engineer was a person paid by salary by the promoters of the work, to assist in carrying out the directions of the engineer-in-chief. This, we believe, is a correct statement of the usual practice in the engineering profession,—of course, open to other arrangements by consent of both parties. In the course of the evidence, much of which was of a rather confused and confusing character, it appeared that much discussion had taken place at the Oxford Waterworks Committee as to the precise position the two engineers were to occupy, and that at a certain meeting (October 12, 1882,) the Town Clerk—

> "Scratched out the words 'as consulting engineer' after Mr. Hawksley's name, and 'as resident engineer' after Mr. Burstal's, and substituted the word 'jointly.' At the next meeting it was resolved that the word 'jointly' was not to constitute a partnership between Mr. Hawksley and Mr. Burstal, and that the former was to bear the sole responsibility. At a subsequent meeting, on April 21, 1883, there was this entry in the minute-book:—'The resolutions and correspondence as to the construction of the filter-beds were read, and after talking the matter over with Mr. Hawksley and Mr. Burstal, it was resolved that Mr. Hawksley be engineer-in-chief, and Mr. Burstal resident engineer,' &c."

A question as to the "intention" of this latter resolution was (naturally) objected to by plaintiff's counsel, and over-ruled by the Judge, as not evidence. Mr. Hawksley stated positively that he never had and never would act as "joint engineer" with any salaried officer of any local board or corporation; but he admitted that he said nothing as to the original proposal—"he was silent on the subject." There is no doubt that to Mr. Hawksley's mind the resolution at the meeting of April 21, 1883, would

convey the idea that he and Mr. Burstal were to occupy the usual positions of engineer-in-chief and resident engineer; but in default of any more definite evidence, it is not surprising that the jury, who very probably thought it was a case of oppression of a small professional man by a great one, gave a verdict for the plaintiff. The evidence did not necessarily lead to the verdict, but it left a way open for it, and Mr. Burstal has been fortunate enough to get a commission, which we imagine no one intended he should have, because various persons failed to put their meaning down clearly in black and white.

THE *Australasian Builders' and Contractors' News*, published in Sydney, and now in its second year of existence, gives in a recent number a view of the buildings for the Great Southern Hotel, Beaumaris, Victoria, and of the second premiated design for the New South Wales State House, at Sydney. The latter, designed by Mr. H. M. Robinson, architect, is a grandiose design in purely classic style, consisting on plan of a great hall, with a vestibule flanked by two wings projecting at right angles to the main building, to be used as museum and picture-gallery. The great hall is admittedly imitated in internal design from St. George's Hall, Liverpool, "the grandest and most successful hall of the kind in existence," says the Sydney paper. The vestibule forms the foundation for a lofty and finely-designed tower, crowned with a cupola. The Beaumaris Hotel is designed by Mr. Birtwistle, of Melbourne, and looks very like a regulation Grand Hotel at a large English watering-place, only rather more so.

FULA, or Foula Island, North Britain, is in the market. It lies "far amid the melancholy main," in N. Lat. 60°, 8′, about eighteen miles west of Vaila Sound, on the Yetland (or Shetland) "mainland," and thirty-five miles north of the Orkneys. Its granite, quartz, and sandstone rocks present some of the finest coast scenery in Scotland, and are the haunt of the Skua gull, known locally as the "bonxie" or "skooi." Measuring two miles and a half by one mile and a half, and belonging to Wallness parish, it has an area estimated at nearly 5,000 acres. The laird's house, of four rooms, is known as Liorafield. Fula is supposed by many to correspond with Virgil's "ultima Thule." Yet Pytheas, the Greek navigator from Marseilles, who explored these remoter seas in the fourth century B.C., says in his work On the Ocean, that Thule (Θούλη) stood six days' sail distant from Britain, and that there, though some such report had already reached his readers, one night and day equally shared a whole year. In his Géographiké Hyphégésis, Claudius Ptolemy, whose latitudes are fairly right, places Thule further south, in Shetland. It is highly probably that Fula, which is plainly in sight from Orkney during clear weather, is the spot mentioned by Tacitus. Describing the limit of his father-in-law Agricola's progress northwards, he writes: —"Invenit domuitque insulas quas vocant Orcades, dispecta est et Thule." According to Bartholomew's Gazetteer of 1887, the population numbered 267 souls. They mostly get their living from the sea, and have one little landing-place for their fishing-boats at Ham, on the island's eastern shore. Shetland and the Orkneys formed Norwegian territory until 1468, when they were pledged to the Scottish crown in lieu of dowry for the Norse Princess Margaret on her marriage to King James III. The pledge was not redeemed when his successor James VI. espoused Anne of Denmark; and still, we suppose, remains in abeyance.

A GREAT deal has been written of late about signed vases; some people seem to think too much, but they will certainly not make the same complaint about signed gems. All gem-lovers will read with pleasure Dr. Furtwängler's "Studies" on gems with artists' signatures, the first of which appears in the new number of the "Jahrbuch" of the German Archæological Institute (band iii., heft 2). Dr. Furtwängler calls attention to the fact that nothing systematic has been done in this direction since Brunn appended to his great book on Greek artists a list of gem signatures. Dr. Furtwängler has been led to study gems by the necessity of making a fresh catalogue of the collection of the Berlin Museum. As he rightly says, no one, unless he has access to and is constantly handling a large number of gems, can write to any purpose on the matter at all, as no department of archæology requires an eye so minutely trained. It will be impossible to summarise the article here; we can only note that it is accompanied by a plate of autotype reproductions, and that most of the signatures are given in facsimile.

THE late Sir George Harrison, during his tenure of the office of Lord Provost of Edinburgh, was mainly instrumental in procuring Blackford Hill as a place of public recreation, and at the eastern entrance to the hill there has been erected a structure to commemorate this and other services he rendered to the public. The memorial takes the form of a Roman triumphal arch, having a carriage-way in the centre and minor arches at each side for foot passengers. The centre archway, which is boldly rusticated, is 13 ft. wide and 17 ft. high to the keystone; it is flanked by attached Ionic columns on pedestals, and similar columns are placed on the outer sides of the minor arches, which are 4 ft. wide and 9 ft. in height. At the springing of the great arch there is a moulded string-course, above which the masonry is rusticated, having raised rectangular panels over the side arches for an inscription. An architrave, frieze, and cornice break over the columns, and in the centre there is a triangular pediment which is to contain a bronze medallion of Sir George Harrison. The whole structure measures 36 ft. in length and 30 ft. in height. The architect is Mr. Sydney Mitchell, and the bronze medallion is to be executed by Mr. Charles McBride, sculptor.

THE Echt estate, lying in Kincardine O'Neil, in the east of Mar, and just twelve miles due west of Aberdeen, and the ancestral home of the Lindsays, Earls of Crawford and Balcarres, is again offered for sale. A considerable part of the existing house, including the library and chapel, was designed by the late Mr. Street. The entire demesne extends to upwards of 8,800 acres, whereof more than one-half is under cultivation; 1,600 acres are moor-ground, stocked with grouse and black game; and 2,350 acres are wood-land; the net rental, as reduced, yields about 4,000*l.* a year. Near to the house are the Loch Skene and the present Earl's well-known private observatory of Dun Echt. This same property was put up for auction at the Mart just two years ago, but was withdrawn when the highest offer had reached 170,000*l.* We are reminded of Scott's lines:—

"Still is thy name in high account,
And still thy verse has charms,
Sir David Lindesay of the Mount,
Lord Lion King-at-Arms!"

The Sir David de Lindesay, seventh feudal lord of Crawford and Glenesk, who was elevated Earl of Crawford on April 21, 1398, overthrew John, Lord Welles, King Richard II.'s envoy to Scotland, in the great tournament that was held on London Bridge on St. George's Day, 1390.

MR. PERCY G. STONE, A.R.I.B.A., whose second premiated design for the Indianapolis Monument we published the other day, writes to us that he is getting together an account of the architectural antiquities of the Isle of Wight, and would be glad of any assistance in the way of drawings or notes, which would be duly acknowledged and carefully returned. It often happens that information on such subjects is offered after the publication of a book, when it is of no avail except for a second edition. Any one who may possess special information which he is willing to impart, by way of rendering the proposed work more complete, is asked to be good enough to communicate with Mr. Stone, at 16, Great Marlborough-street, W. There is such a freemasonry among true archæologists that we have no doubt they will respond to such a request in the spirit in which it is made.

WE published a few weeks ago an illustration of Mr. Mullins's memorial statue to Barnes, the Dorsetshire poet. The *Edinburgh Review*, in a sympathetic notice of his works, reminds us of one which we had forgotten, and which shows how the author of "Hwomely Rhymes" could make a spirited little poem on so commonplace an event as the building of a small house on a plot of freehold ground. The reviewer says:—

"John Blake,—'Merry Bleäke of Blackmwore'—had a bit of ground which came to him by his mother's side, and an uncle left him a legacy of 200*l.* His wife and daughters approved of his purpose of building a house and paying no rent, and he lost no time in commencing the undertaking.

"Then John he call'd vor men o' skill,
An' builders answered to his call;
An' met to reckon, each his bill,
Vor vloor and winow, ruf an' wall."

The negotiations which ensued are vividly described:

"An' woone did mark it on the groun',
An' woone did think, an' scratch his crown,
An' reckon work, an' write it down:
'Zoo, zoo,' woone treädesman cried,
'True, true,' woone mwore replied.
'Aye, aye; good work an' have good pay,'
Cried merry Bleäke of Blackmwore."

When the bargain was struck, there was no procrastination, nor were the workmen hindered from doing their best by any trades-union regulations:—

"The work begun, an' trowels rung,
An' up the bricken wall did rise,
An' up the slanten refters sprung,
Wi' busy blows an' lusty cries!
An' woone brought planks to meäke a vloor,
An' woone did come wi' durns* or door,
An' woone did zaw, and woone did bore.
'Brick—brick, there down below,
Quick, quick,—why b'ye so slow?'
'Lime, lime,—why do we weäste the time,
Vor merry Bleäke of Blackmwore?'"

Then follows a description of the house-warming, and the healths and good wishes, and of the owner's satisfactory reflections on the following morning when he fully realised the greatness of his new possession:—

"An' when the morrow's zun did sheen,
John Bleäke beheld, wi' jäy an' pride,
His bricken house, an' pworch, an' green,
Above the Stour's rushy zide.
The swallows left the lwonesome groves
To build below the thatchen oves,†
An' robins come vor crumbs o' lwoaves:
'Tweet, tweet,' the birds all cried;
'Sweet, sweet,' John's wife replied;
'Dad, dad,' the children cried so glad,
To merry Bleäke o' Blackmwore."

It will be observed that here architecture, even in its humblest form, is represented as pre-eminently the social art, the centre of life and society. John Blake's "bricken house" was probably a poor object enough architecturally (in the ordinary sense of that word), but it aroused the honest exertions of the local artisans, the birds clustered round and built on it, and the wife and children were happy over it, and so it became a centre of human affections and interests, and had a poetry of its own, like many another cottage, "bricken," or rough-dashed, or half-timbered, or even—but no, one must draw a line somewhere: we cannot fancy even simple-minded John Blake feeling "jäy and pride" over a corrugated iron shanty!

The New Government Buildings in Christiania.—The committee (consisting of the leading architects in Norway, Sweden, and Denmark) charged with the consideration of the designs invited for the new Government buildings to be erected in Christiania,—to which we recently referred,—have rejected in their present form all the plans submitted, the chief objection being the unsuitability of the material proposed for a severe climate like that of Norway. However, in accordance with the terms of the competition, five of the competitors, who will receive fees, have been invited to send in amended designs. The cost of the building is to be about £100,000.

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* Door-posts. † Eaves.

THE WHITEFIELD CHAPEL, AND ITS BURIAL GROUND.

IT is satisfactory to find, from Lord Brownlow's reply to Lord Meath's inquiries in the House of Lords a few days ago, that the Government are alive to the scandalous uses which the disused burial-ground along the northern side of Whitefield's Chapel, in Tottenham Court-road, is now made to serve. A lease was granted in 1756 to George Whitefield, from out of the Southampton estate, of a plot of ground known as the Crab and Walnut Tree field, by Coyer's Gardens and the Little Sea pond. The original building, being about 70 ft. square on plan, and vulgarly styled the "Soul-Trap," was enlarged in 1759 by the addition of an octagonal front,—the "Oven." The story goes that this was done mainly at the cost of King George II.'s consort, who had seen a large crowd at the doors; but this could not be, since Queen Caroline of Anspach died in 1737. Whitefield died, in America, in 1770, which demolishes another oft-repeated tale that he caused some consecrated earth to be carried hither from St. Christopher-le-Stocks. That church was not finally dismantled until about 1788, for the enlargement by Sir John Soane of the Bank of England towards the west and north: its graveyard yet remains, within Garden-court, at the Bank.

It appears that in the year 1828 the original lease as obtained by Whitefield fell in, and the chapel for awhile was closed. In 1831 some trustees bought the copyhold for 20,000*l*., but incurring considerable expense in repairing the damages by a fire, they found it necessary to mortgage the site. Since only portion of their debt was discharged, the mortgagee foreclosed. Then ensued ligitation upon various differences and disputes, which seems to have not yet concluded. In 1853 the ground was closed against further interments. Four years later an injunction was obtained against the owner of the land, who had tried to take away some gravestones. On two occasions since, he has been prevented from building over the land. On the other hand, it is stated that in 1879 the owner was successful in exerting his rights as against the St. Pancras Vestry, who had designed to plant trees here. He has now, in Lord Meath's words as reported, "hit upon the ingenious device of inviting all the perambulating fairs in the country to come there." This license, however, is restricted by the Court in so far as not to interfere with the conduct of divine service. Yet a good deal more is needed. The Earl of Brownlow said that the Treasury solicitor has been instructed to apply existing statutes for ensuring an abatement in this particular quarter, of what is generally considered as a nuisance; adding that, failing this remedy, the Government will not hesitate to take such steps as shall secure an alteration in the law. A Bill, *ad hoc*, was recently blocked in the House of Commons.

We may here add that in terms of the Metropolitan Open Spaces Act of 1881, the owners of any burial-ground within the metropolis, and which is closed for burials, may provide for its being laid out as a recreation-ground under conveyance to, or arrangement with, the Metropolitan Board of Works, the Vestry, or the District Board,—a faculty, however, being required in the case of any consecrated ground. Again, the Disused Burial Grounds Act of 1884, declares (section 3) that it shall not be lawful to erect any buildings upon any disused burial-ground [as closed by order in Council], except for the purpose of enlarging a church, chapel, meeting-house, or other places of worship. But this prohibition does not extend to, *inter alia*, any burial-ground which has been sold or disposed of under the authority of any Act of Parliament, or to buildings for which a faculty was obtained before the passing of the Act in 1884.

The Institution of Mechanical Engineers.—The Summer meeting of the Institution of Mechanical Engineers will be held in Dublin on Tuesday next, the 31st inst., and two following days, under the presidency of Mr. Edward H. Carbutt. An influential committee has been formed for the reception of the Institution, under the chairmanship of the Right Honourable the Earl of Rosse, F.R.S. On Friday, August 3rd, a visit will be paid to Belfast, on the invitation of a local committee presided over by the Mayor, Sir James H. Haslett.

THE NEW WORKS AT BARKING SEWAGE OUTFALL.

WE mentioned last week (p. 44), in our report of the proceedings in connexion with the annual meeting of the Association of Municipal and Sanitary Engineers and Surveyors, that a visit was paid on Saturday, the 14th inst., to the extensive, elaborate, and costly sewage precipitation works now in course of construction by the Metropolitan Board of Works at the Northern, or Barking, Outfall of the Metropolitan Main Drainage System. The works have since been visited (on Tuesday last, the 24th inst.) by the Society of Engineers. On the occasion of the first visit, the following description of the works, by Sir Joseph Bazalgette, their engineer, was read by Mr. Thomas Cole, the secretary of the first-named Association:—

At the present time, the whole of the sewage of the metropolis north of the Thames is conveyed to Barking Creek by three culverts, each 9 ft. high by 9 ft. wide, and is in the first instance delivered into a covered reservoir, divided into four compartments, and altogether extending over an area of nine acres. The sewage is stored in this reservoir during eight hours of each tide, and discharged into the river at high-water at the top of the ebb. This reservoir is situate on the east side of the sewer, and immediately adjacent to the river bank.

The works now being constructed consist of covered precipitation tanks adjacent to this reservoir on its north side, and occupying the ground between the outfall sewer and Barking Creek, an area of between ten and eleven acres.

There will be thirteen of such tanks, each 31 ft. 6 in. wide, placed parallel to the northern side of the existing reservoir, of somewhat unequal lengths, but averaging about 1,000 ft. long. Communications will be made between the outfall sewer and each of these tanks, each fitted with two penstocks, so that communication may be opened or shut off at pleasure.

The sewage will be admitted into each of the tanks in succession, and after being allowed to remain quiescent for a sufficient time to admit of the deposit of the solids in the sewage, the precipitation of which will be expedited by the admixture of 3·7 grains of lime and 1 grain of proto-sulphate of iron per gallon, the effluent will be run off over a weir, which will fall as the water in the tank lowers, so that the top film of the effluent only will be taken off and the tank emptied gradually, so as to prevent any disturbance of the solids by the operation.

The effluent, after flowing over the weirs (of which there will be ten in each tank), will pass into culverts carried transversely under the tanks, and extended,—some into the compartments of the existing reservoir,—and some into a chamber under the outfall sewer through which at present the sewage is discharged into the river from the existing reservoirs. When the level of the tide will admit, the effluent will be discharged through this chamber direct into the river, but when the water in the river is too high to admit of this, the effluent will be conveyed by the other culverts into the several compartments of the present reservoir, and stored there until the level of the water in the river will admit of its discharge.

When each compartment is emptied of the effluent, the sludge, which will be in a semi-liquid state, will be discharged through culverts passing under the outfall sewers into a collecting culvert, from which it will be conveyed by pipes into a receiving well or sump, and pumped into a series of twelve tanks placed side by side, and situate between the outfall sewer and the river. These tanks will each be 20 ft. wide and 140 ft. long, will cover an area of over an acre and a half, and, like the precipitation tanks, will be covered, so as to prevent nuisance. The sludge will be allowed to remain quiescent in them so as to allow of a further precipitation, and the effluent water will be discharged over weirs into a culvert, which will convey it into a store under the tanks, from whence it will be lifted and discharged through pipes to the liming station, there to be mixed with the lime which is used for precipitation.

The settled sludge remaining after this further precipitation will be discharged through culverts into a sludge store situate under the tanks, and will be lifted thence and conveyed by pipes along a jetty and to a landing stage to be erected in the river, and there discharged into ships, which will convey the sludge to sea. In the event of the ships being detained by stress of weather, there is a further store for the sludge at a lower level, extending under the whole of the area occupied by the upper store.

On the north side of these sludge settling-tanks will be erected engine and boiler houses and workshops in connexion, to contain engines and machinery for lifting the sludge into the settling tanks and the settled sludge into the ships, as well as for pumping the sludge effluent to the liming station.

The lime for assisting the precipitation of the solids of the sewage is to be introduced into the outfall sewers at a point about 700 yards, and the proto-sulphate of iron at a point about 530 yards, above the precipitation channels.

The liming station will comprise a lime store; floors for slaking the lime; six tanks for mixing the slaked lime with the effluent water from the sludge settling tanks, or with sewage taken direct from the outfall sewers; and an elevated lime-water tank or reservoir built above the lime-store, and into which the lime-water will be lifted by pumps, for which machinery and the requisite engine and boiler houses will be erected adjacent to the lime-stores. From this elevated tank the lime-water will be conveyed to and injected into the sewage passing along the outfall sewers through cast-iron injectors placed in the sewers.

There will be means of turning the lime water into any one of the three lines of sewers, and of regulating the supply by means of sluice-valves fitted to the pipes leading to the injectors. The injectors consist of cast-iron chambers, 4 ft. 6 in. in length, 6 in. wide, and 6 ft. in height, fitted with a number of nozzles through which the limewater will be injected and mixed with the volume of the sewage as it flows past.

The iron-water station comprises timber-sheds for storing the proto-sulphate of iron, a mixing-shed in which the iron will be crushed and mixed with water, an engine-shed to contain engines and machinery for crushing the iron and mixing it with water, as well as for raising water for boilers and into mixing tank. The iron water will be conveyed by stoneware pipes carried underground and along the top of the outfall sewer into a service-tank, from which it will be carried by pipes into each of the three outfall sewers, and injected into the sewage through perforations in a pipe fixed vertically in each of the sewers. As with the limewater, there will be appliances for regulating the supply of iron-water to each of the sewers, to meet the varying requirements of the discharge.

There will be a large settling-pond covering an area of 1¼ acre situate near the river, divided into six compartments, each 60 ft. by 60 ft. and about 7 ft. deep, into which water will be received from the river and allowed to settle, the clear water being afterwards filtered and used for the supply of the several boilers, for slaking the lime, and for mixing with the proto-sulphate of iron.

There will be a timber and coal shed for storing a supply of coal for the various engine stations. It will be situate on the western boundary of the Board's land, and will be 126 ft. long by 31 ft. in width. In consequence of the unsatisfactory nature of the ground, this shed and the other timber buildings will be carried upon piles, which will be carried up to support the roof.

The jetty, which will extend 576 ft. into the river from the present river bank, will be 15 ft. wide, and will be a timber structure supported upon piles. At the river end of the jetty will be a pier or landing-stage, 300 ft. in length, and 20 ft. wide, the front of which will range with the pier of the Beckton Gasworks. This pier will also be of timber, supported upon piling, and protected by dolphins at each end.

The iron pipes for conveying the sludge to the ships will be carried under the platform of the jetty and pier, and will be furnished at the end with a delivery-pipe, socketed to admit of a vertical movement, so as to conveniently discharge the sludge into the ships at all levels of the tide. The pier and dolphins are arranged for two ships to lie alongside at the same time.

A tramway will be laid along the full length of the pier and jetty, and will be extended through the works on the west on a higher level to the coal store and liming station; and to the east on a descending level to the iron-water station. There will be branches from this on the low level to the general coal store and main

engine station to the north of the sludge-settling tanks. The trams will all be above the present surface of the ground, and will be generally carried upon earth in embankments; but in some parts upon timber staging.

These tramways will enable the coals, lime, proto-sulphate of iron, and other materials used on the works, to be unloaded at the pier or jetty, and delivered with facility to the several stations, and will facilitate the distribution of coal from the general coal store to the several engine stations.

The contract for these works includes the erection of twelve cottages and a residence for the superintendent, and the diversion of the old Galleons sluice and ditch, which is one of the main sewers under the jurisdiction of the Essex Commissioners of Sewers.

There will be a large quantity of surplus earth from the excavations, which will be used in forming the banks for the tramways and in raising the general level of the ground, which is now 6 ft. or 7 ft. below the level of Trinity high water.

The works extend over an area of about 50 acres, the quantity of sewage to be dealt with will amount to about 90,000,000 gallons per day, and the quantity of lime to be used in purification is 23 tons per day.

Two contracts have been entered into for the execution of these works,—one with Messrs. John Mowlem & Co., for the general works, for 406,000*l.*; and the other with the Glenfield Company, of Kilmarnock, for engines and machinery, for 42,567*l.*

The foregoing description was, in substance, read by Mr. Arthur T. Walmisley, the President of the Society of Engineers, to the members of that body who visited the works on Tuesday last.

The visitors on both occasions referred to were very kindly received and conducted over the works by Mr. G. Marshall, the assistant engineer; Mr. George Burt, jun. (of the firm of John Mowlem & Co., the contractors); Mr. William Rowell, the contractors' engineer; Mr. John Jackson, the contractors' manager on the works; Mr. Pope, the clerk of works, and other officials. Mr. Burt, in the course of the proceedings, said that they (the contractors) had now been on the ground some sixteen or seventeen months, during which period they had had a good deal of bad weather. In that period they had excavated and removed something like 400,000 cubic yards of stuff, chiefly of a peaty or boggy nature, and principally got out of holes 6 ft. square by an average of 30 ft. in depth. (These holes, it may be explained, were excavated, right down to the gravel, for the brick piers which, resting on concrete, form the main supports of the structural brickwork of the precipitation and sludge tanks.) They had used 30,000,000 of bricks and 36,000 tons of Portland cement, while 300,000 tons of ballast had been put in as concrete.

The gault bricks used on the works were made at and supplied from the Aylesford Pottery, near Maidstone (Mr. Joseph Hamblet, manager). Mr. Hamblet also supplied a large quantity of blue bricks from his works at West Bromwich. The iron roofs of the engine and boiler-houses have been supplied by Messrs. Handyside & Co., of Derby, and the iron pipes, valves, penstocks, injectors, &c., by Messrs. Oakes & Co.

We may add that we gave a tolerably full description of the works last year (see *Builder*, Dec. 17, 1887, p. 838); and that in the *Engineer* for Feb. 4 and Feb. 11, 1887, will also be found an illustrated description of the works. Works of a similar kind, for dealing in the same manner with the sewage of the south side of the Metropolis, have lately been commenced by the Metropolitan Board at the Crossness Outfall works, and the tender of Mr. William Webster, amounting to 259,816*l.*, has been accepted for the construction of these works.

Testing Roof Slates.—A German trade journal advocates the following method for testing the quality of roof slates. The samples of the slate to be tested should be carefully weighed, and then put into boiling water for a quarter of an hour. The water must, however, be fairly free from lime, saltpetre, and ammonia. The slates are then re-weighed, and those that show the greatest increase in weight are those most capable of resisting deterioration.

BRISTOL AND GLOUCESTERSHIRE ARCHÆOLOGICAL SOCIETY.

THE thirteenth annual summer meeting of this Society was, as briefly mentioned in our last, opened in Gloucester on the 16th inst., when, although rain fell in torrents, there was a good attendance, about fifty or sixty members and friends being present. At noon the members assembled in the Tolsey, and were welcomed by the Mayor on behalf of the citizens. The proceedings of the meeting at once commenced, under the presidency of Lord Sherborne.

The Rev. W. Bazeley read the report of the Council for 1887-8, which stated that there are at present 389 annual members, 77 life members, and 3 honorary members,—a total of 469. The income for the year, with the balance brought forward from the previous year, was 535*l.* odd, the expenditure 271*l.*, and the balance in hand on April 21 was 263*l.* From this, however, had to be deducted the cost for the annual volume of Transactions. A balance of 80*l.* was still due from the Berkeley MSS. fund to the general fund. The Society had also a funded capital of 432*l.* There had been three meetings during the year,—the annual Summer meeting at Stratford-on-Avon, the special meeting at Tockington Park to inspect the then recently-discovered Roman villa and tesselated pavements,* and the annual Spring meeting six weeks ago at Chipping Sodbury. In August the Council issued a prospectus for printing, by private subscription, the Cartulary of Winchcomb Abbey, Lord Sherborne, President of the Society, having placed the original MS. at the service of the Council, and the Rev. D. Royce having offered to edit the papers free of cost. The promised subscriptions, however, fell considerably below the estimated cost of printing, and Mr. Royce had now determined to print the Cartulary on his own responsibility, the subscription being thrown open to the public. During the year the Council has endeavoured on more than one occasion to "arrest the hand of the destroyer." The Dursley secretary having reported that the tumulus at Uley, known as "Hetty Peglar's Tump," which was scheduled in the Act for the Protection of Ancient Monuments, was being damaged by mischievous persons, the general secretary and Colonel Forbes were asked to inspect the tumulus, and report. It was found that several stones forming the chamber had been removed, and that the whole structure was in a dangerous condition. The report was sent to General Pitt-Rivers, who had promised to take the necessary steps for the protection of the tumulus, but pointed out that the Act was passed to enable magistrates to punish summarily, and that persons who live near scheduled ancient monuments should assist in bringing delinquents to justice. It had also been brought to the notice of the Council that in the Spring the ancient camp near Clifton Observatory, and part of the Roman wall at Gloucester, were in danger of demolition. A protest was made, and the Council rejoiced that the danger in each case had for the present passed away. The rector and churchwardens of Dursley had also been written to, pleading for the preservation of the old communion plate at the parish church, which it had been suggested should be converted into vessels of a less cumbrous pattern. The report referred with regret to many officers and members of the Society who had died during the year, mentioning Sir W. V. Guise, one of the principal promoters, the first president, and president of the Council for ten years; Mr. S. H. Gael, Cheltenham; Colonel Lowe, and Mr. E. Witchell, Stroud. The Council nominated for re-election Sir Brook Kay as president of the Council, the vice-presidents, treasurer, and secretaries, and also nominated as vice-presidents Sir. H. Barkly, president for 1886-7; Professor Middleton; Mr. F. F. Fox, chairman of the Chipping Sodbury local committee; Mr. F. James, Edgeworth Manor; and Mr. Wilfrid Cripps, Cirencester; also Mr. C. Witchell as local secretary for Stroud, the Rev. E. Evans for the Newent district, and the Rev. H. L. Thompson for the Thornbury district.

The report was adopted, the various officers were elected, and a vote of thanks was passed to Lord Sherborne, the retiring president, who introduced the president-elect, Mr. R. V. Vassar-Smith, ex-Mayor of Gloucester.

The President-elect read his inaugural address, which had reference to the muniments of the Gloucester Corporation. These documents are now being examined by Mr. Stephenson, who will prepare a report for the Historical Manuscripts Commission. The President read a number of extracts from these papers, giving interesting particulars of the history of the city, and recounting, among other matters, the visit of King Henry and Anne Boleyn to Gloucester.

A vote of thanks was accorded to the President for his paper, and he, in reply, thanked the Society for having elected him President for the year.

In the afternoon the Dean received the members in the Chapter House of the Cathedral, and having welcomed them and briefly referred to the interesting history of the room in which they were assembled, he escorted the visitors into the Cathedral, where he gave another address descriptive of the various styles of architecture to be found in it, and a running commentary on the historical personages whose names were associated with the great building. The party then divided into three sections, and were taken over the building under the guidance of the Dean, the Rev. W. Bazeley, and Mr. F. W. Waller, architect. Afterwards the party visited the Deanery.

A meeting was held in the evening at the Tolsey, for reading and discussing papers. Among these, Mr. Henry Jeffs read a paper on "The Mason's Square and Masons' Marks," with special reference to Gloucester Cathedral, illustrated with diagrams. These marks abound at Gloucester, where there is also, in the south transept, a curious monument in the form of a mason's square, and underneath it figures of a man and boy, the former having mason's tools in his apron. Tradition says that this is the monument of one John Gower, who was employed in converting the Norman work of the transept into Early English, and that he killed the boy, who was his apprentice. Mr. Jeffs showed that neither the modern Fraternity of Freemasons nor the Lodges of Mark Masons had anything to do with the masons' marks in buildings. He showed that these marks were to be found in ancient buildings in Egypt, on the Pyramids, in Greece, throughout Europe, and in Mexico, Peru, &c., while some of those in Gloucester Cathedral resembled the marks found in Carthage and in the Egyptian almanacks. He suggested that these marks, which had long formed an enigma apparently not to be solved, were nothing more than marks made by the workmen, just as used to be, and was still, the practice for workmen in the porcelain manufacture to put a mark on their products.* He considered that the modern trade-mark was simply an imitation of these masons' marks, and that many of the marks in old stones in our churches were cut by the workmen as a pastime, as men nowadays cut their names on oak benches.

Mr. Henry Medland, architect, next read a long and interesting paper on St. Oswald's Priory, Gloucester. The earliest presumed foundation of this institution was given as about 660, but the more generally received account was that it was founded in 909 by Ethelred, Prince of the Mercians, and his wife Ethelfreda, daughter of Alfred the Great, in honour of St. Oswald, King and Martyr. Mr. Medland gave an outline of all that is reported of Oswald, how he became a Christian, and aided in the spread of the Christian religion, and was associated with the founders of Iona and Lindisfarne, and how he fell in battle, and his body was hacked in pieces. It is stated that some of his relics were brought to Gloucester. Mr. Medland traced the history of the Priory, and showed that at the Dissolution the seven canons who then occupied the Priory were sent forth to the world with 16s. 8d. divided between them. The south aisle of the Priory church became the parish church of St. Catherine, but at the siege it was greatly damaged, and the Parliament gave the building to the Corporation, who used the roof and part of the material in the erection of a barley market in another part of the city. What remains of the ancient church is now a beautiful ruin, and, thanks to Mr. Medland's care, many fragments of the old Priory are built into it. The other part of the Priory has entirely disappeared, and some of the estates were given by King Henry VIII. to the Dean and Chapter of Bristol. One most interesting feature of Mr. Medland's paper was an account of the discovery by him, a month ago, of a beautifully sculptured stone, bedded in a wall adjoining the Priory. This stone evidently

* See illustrations in the *Builder* for Nov. 19, 1887, p. 699.

* This is no new suggestion. The subject, as many of our readers will know, was one which was pretty fully investigated by the former Editor of the *Builder*, the late Mr. George Godwin.

formed the shaft base of a churchyard cross; the sculpture is Celtic in character, and it is suggested that it formed part of a memorial to St. Oswald, and was the work of an artificer from Iona or Lindisfarne.

On the 17th inst. the members again assembled at half-past nine, when Mr. John Bellows gave an address on "Roman Gloucester," in which he described how Roman camps were formed along the banks of the Rhine, and in other parts of Europe, and how, after arrangements had been made by building ships in Holland, the landing of some 25,000 Roman soldiers in this country was effected, and the first camp was erected at Winchester. The invaders extended themselves over this country, and Gloucester became one of their chief settlements. He quoted evidence to show the progress made by the Romans in the neighbourhood, and described the formation of their camps, showing that the principal outline of the present chief streets of Gloucester followed the lines of the Roman colony. Immense numbers of Roman coins had been found in Gloucester and the vicinity, as well as tesselated pavements, remains of temples, &c., all showing the importance of the settlement. The Romans walled in the city, and portions of the wall yet remained, while the line of its boundary could be definitely traced. The Rev. W. Bazeley followed with a paper on "Mediæval Gloucester," and the remainder of the day, the rain fortunately holding off, was spent in perambulating the city and inspecting the Roman remains, the ancient churches, the remains of the Grey and Black Friars, and the many interesting old houses. Explanations in regard to all these places were given by Mr. Bellows, Mr. Waller, and others. In the evening another meeting was to take place to hear papers read. These included the Rev. W. H. Davies on "The Grey Friars"; the Rev. S. E. Bartleet on "The Hospitals of SS. Margaret and Mary Magdalene"; Mr Wilton on "Gloucester Tokens"; and two or three others.

There was heavy rain on Wednesday, the 18th inst., but five or six vehicles started for Brookthorpe, Haresfield, Standish, Hardwicke Court and church, and Elmore Court. At night there was a *conversazione* and inspection of the museum.

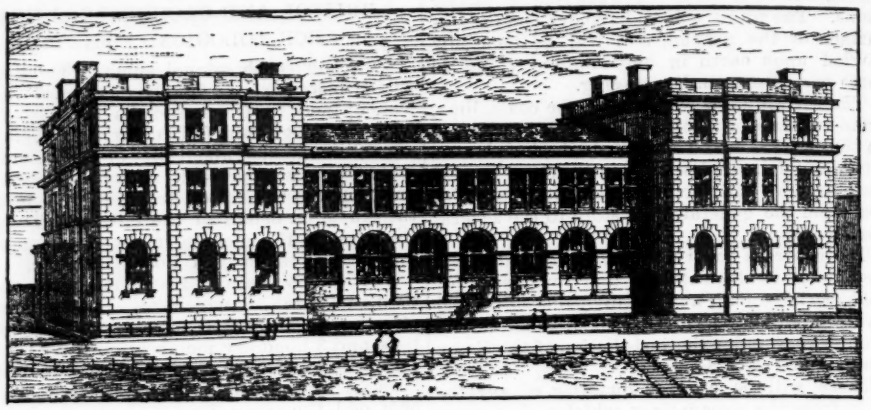
The closing meeting was held on Thursday, the 19th, when Cheltenham was selected for the next summer meeting, the appointment of president being delegated to the Council. The usual votes of thanks were passed, and then a large party started, in carriages, to inspect the ancient church and camp on the summit of Churchdown Hill, the beautiful Decorated church at Badgworth, and Prinknash Park, an interesting residence on the slope of the Cotswolds, built as a summer residence by an abbot of Gloucester, and which, in old days, was visited by Henry VIII. and Anne Boleyn. Mr. Dyer-Edwardes, the present owner of the property, and Mrs. Dyer-Edwardes, hospitably received the visitors, who inspected the interesting old mansion, after which they returned to Gloucester. The whole four days' proceedings wound up with a "city meeting" at the Shirehall, at which the Dean presided, and addresses on historical subjects and buildings were given.—(Abridged from the Bristol *Times and Mirror*.

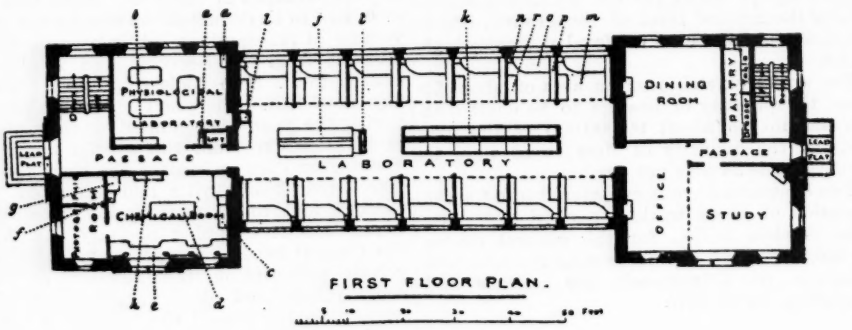
THE MARINE BIOLOGICAL LABORATORY AT PLYMOUTH.

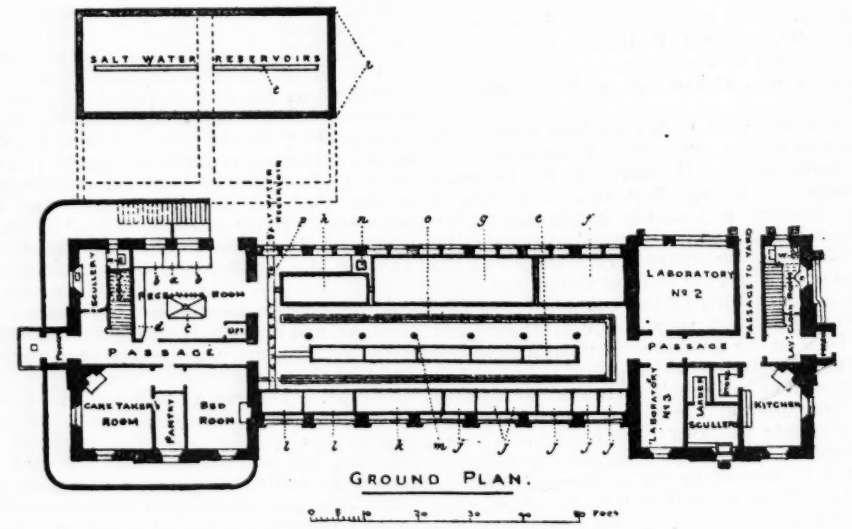
WE recently quoted from *Nature* a general description of this new building. As the building is one of some novelty and interest, we now publish a small view of it, and three plans.*

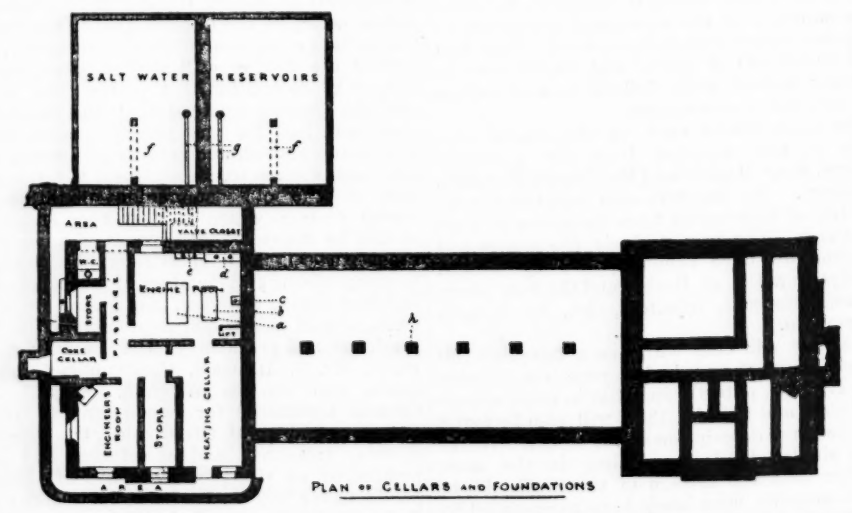
The Laboratory is situated between the south wall of the "Citadel" and the Sound, at a height of 95 ft. above the level of the sea. The site, which has been granted to the Association by the War Office, occupies the whole length of King Charles's Curtain, 265 ft., and extends southwards from the citadel wall 240 ft., giving a surface of, say, 63,600 ft. A road lies between this plot of land and the sea, and private access to a small section of the seaboard is provided for by means of a tunnel, 7 ft. 6 in. high and 6 ft. 6 in. wide, which leads from the area surrounding the cellars, beneath the road to the rocks below.

* The view and plans are reduced copies of illustrations which appeared in the first number of a new and interesting quarterly magazine, entitled the "Journal of the Marine Biological Association of the United Kingdom." We reproduce them by permission, and also quote some particulars of the building from the description given by Mr. Walter Heape, M.A., in the "Journal."









The Marine Biological Laboratory, Plymouth.

REFERENCES TO PLANS.

Plan of Cellars and Foundations.—*a*, Four-horse power gas-engine; *b*, Two-horse power gas-engine; *c*, Compressed air receiver; *d*, Duplicate pumps, to throw 7,500 gallons an hour; *e*, Duplicate pumps to throw 2,000 gallons an hour; *f*, Arching, in plan; *g*, Drains; *h*, Foundations for pillars to support Dennett's arching.

Ground Plan.—*a*, Sink in Receiving-room; *b b*, Tables; *c*, Slate-topped table; *d*, Shelves; *e*, Five table tanks, each 9 ft. 9 in. long, 2 ft. 3 in. wide, 1 ft. 9 in. deep; *f*, Tank, 15 ft. 6 in. long, 9 ft. wide, 5 ft. deep; *g*, Tank, 30 ft. 6 in. long, 9 ft. wide, 5 ft. deep; *h*, Tank, 15 ft. long, 5 ft. wide, 5 ft. deep; *j*, Six tanks, each 5 ft. long, 4 ft. wide, 4 ft. deep; *k*, Tank, 15 ft. long, 4 ft. wide, 4 ft. deep, Two tanks, each 10 ft. long, 4 ft. wide, 4 ft. deep; *m*, Pillars to support Dennett's arching; *n*, Manhole into circulating reservoirs along north side; *o*, Trench covered with grating containing hot-water pipes; *p*, Culvert conveying salt-water from circulating to main reservoirs; *r*, Raised portion of reservoirs.

First-floor Plan.—*a a*, Two sinks in Physiological Laboratory; *b*, Cupboard with air-tight glass doors; *c*, Sink in Chemical Laboratory; *d*, Slate-topped table; *e*, Bench; *f*, Blowpipe table; *g*, Stink cupboard; *h*, Shelves; *j*, Slate-topped table in main Laboratory; *k*, Twelve tanks, each 1 ft. 6 in. deep, 2 ft. 3 in. wide, 5 ft. long; *l l*, Two sinks; *m*, a "Compartment"; *n*, Sink; *o*, Bench; *p*, Shelves *r*, Tables with drawers and cupboards.

The building is placed 90 ft. from the wall of the Citadel, and is about 60 yards from high-water mark. It is in the form of two blocks, which are each 34 ft. 6 in. long by 42 ft. wide and three stories high (40 ft.), and a central connecting portion 70 ft. long by 34 ft. 6 in. broad and two stories high (30 ft.). The east, south, and west fronts are built entirely of dressed limestone, which has been excavated on the spot; but on the north front the window and door dressings are of brick.

The roof of the central portion is peaked and covered with slate; that of the two blocks is flat and covered with lead.

Below the western block cellars have been excavated (see plan of them) 14 ft. deep, surrounded by an area 6 ft. 6 in. wide on the north and 4 ft. wide on the west and south sides; further, the excavation has been extended between the cellars and the Citadel wall to form two reservoirs for salt water, each 37 ft. 6 in. long, 21 ft. 6 in. wide, and 13 ft. deep, and each capable of holding 50,000 gallons. The roof of a portion of each of the reservoirs (see left-hand top corner of ground-plan) is 6 ft. higher than the remainder, and is fitted with a gangway (*t*) to enable a man to walk inside. These reservoirs are built of concrete, and coated with a special asphalte supplied by Messrs. Leete, Edwards, & Norman, of London; they are arched in with brick and completely covered over.

The arrangement of rooms in the building is as follows:—

Cellars.—The cellars (see plan) are 13 ft. high, and consist of an engine-room, 20 ft. by 16 ft.; a boiler-room, 20 ft. by 11 ft.; an engineer's room, 13 ft. by 11 ft.; a coal-cellar, store-room, and w.c. Access to the cellars is provided for by means of steps down into the area on the north side.

Ground Floor, West Block.— The rooms on the ground floor (see plan) are 12 ft. high. The main entrance to the building is in the centre of the west face of this block, and leads, on the one hand, by means of a straight passage 6 ft. wide direct into the aquarium, and, on the other hand, by means of a staircase 9 ft. wide, to the first floor. A urinal is placed leading from the landing of this staircase. On the south side of the entrance are two rooms to serve as kitchen and bedroom for the caretaker of the building; these rooms are each 14 ft. by 12 ft., and between them is a pantry 9 ft. by 6 ft. On the north aide of the entrance the scullery and offices for the caretaker, the staircase leading to the first floor, and a "Receiving Room" 20 ft. 6 in. by 16 ft. are placed.

Centre.—The central part is occupied by the aquarium, from the east end of which a door leads into the

East Block.—On the north side of this block is Laboratory II., 17 ft. 6 in. by 16 ft.; on the south side Laboratory III., 15 ft. by 9 ft. The remainder of this floor of the block is occupied by the kitchen and offices of the superintendent's residence. The main entrance to the residence is in the centre of the east face of the block; it leads into a passage from which direct communication with the aqnarium is provided. A staircase 7 ft. wide leads to the first floor. A back door is placed on the north side.

First Floor, West Block. — The rooms on this floor (see plan) are 11 ft. high. The staircase opens on to a landing above the entrance hall, and from this point a staircase communicates with the second floor, and a passage 6 ft. wide leads into the main laboratory. On the north side of this passage is the Physiological Laboratory, 20 ft. 6 in. by 16 ft.; on the south side the Chemical Laboratory, 22 ft. by 14 ft., and a small room communicating with the latter, 8 ft. by 14 ft., which is designed to serve as a photographic room. These two laboratories are entered through doors which open into the passage. At the end of the passage a door leads into the

Centre.—The main laboratory occupies the whole of the first floor of this portion of the building. It is provided with seven large windows on each side, which reach from a point 2 ft. 6 in. from the floor to a height of 10 ft. from the floor. The roof is a collar-beam roof with tie rods leading down to the feet of the principals. It is 16 ft. from the floor to the ceiling along the centre of the room. The floor is especially constructed of Dennett's arching to ensure freedom from vibration as much as possible.

East Block.—The rooms on this floor are a dining-room, pantry, and study for the superintendent, and an office from which a door leads directly into the main laboratory.

*Second Floor, West Block.**—The rooms on this floor (of which it is hardly necessary to give a plan) are 10 ft. high. The staircase and passage are the same as on the first floor. On the north side of the passage is a lavatory, 16 ft. by 8 ft., for the convenience of workers in the laboratory, and a private workroom, 16 ft. by 12 ft., while the whole of the south side is occupied by the library, a room 30 ft. 6 in. long and 16 ft. wide.

*Second Floor, East Block.** — This floor is occupied by bedroom accommodation, &c., for the superintendent and his servant. A small staircase, 2 ft. wide, will lead from the second floor on to the flat roofs of each block.

As we have already mentioned, the general arrangement of the building is due to Prof. Lankester; the details have been carried out Mr. J. C. Inglis, engineer, of Plymouth; and the design of the "front" was supplied from the War Office.

THE METROPOLITAN BOARD OF WORKS AND THE LONDON SEWAGE.

LIEUT.-COL. JONES, V.C., has sent us a copy of the charges of irregularity of procedure which he and Mr. Bailey Denton make against the Metropolitan Board of Works in connexion with the London sewage question. These charges were submitted on the 4th of May last to Lord Herschell, the Chairman of the Royal Commission now inquiring into the affairs of the Metropolitan Board of Works. Of course, it is no part of the Commissioners' duty to go into technical matters or into the merits of any particular scheme of sewage disposal, and though Lord Herschell may not wish to get involved in any questions of that kind, the charges are sufficiently serious to merit some attention. They are regarded by many people as being within the terms of the reference to the Royal Commission, which was appointed to "inquire into and report upon the proceedings of the Metropolitan Board of Works, and into irregularities alleged to have been connected therewith." The following are the charges,—

"*Firstly.*—In the publication of reports setting up,—as sufficient guarantee to justify a large expenditure,—a very qualified and guarded statement obtained from four eminent chemists in return for a fee of 500*l.* for witnessing certain limited experiments instituted by the Chemist of the Board, and thus conveying to the Metropolitan ratepayers false impressions bearing upon the most important matter committed to the Board, *i.e.*, the purification of the River Thames.

Secondly.—In withholding from the ratepayers and from the public generally, the opinion of one of the Members of the Board, specially possessed of chemical knowledge,† applied by him to a branch of this subject, and, inferentially, condemning (in December, 1886,) the course pursued by the Board in the expensive experiments adopted by them at the outfalls.

Thirdly.—In like manner withholding from the ratepayers, up to the present date,‡ the unfavourable reports of Sir Henry Roscoe, F.R.S., M.P., made after he had been appointed, in May, 1887, the independent referee, and, subsequently, Consulting Chemist of the Board.

Fourthly. In refusing to entertain or discuss two different tenders from the undersigned, whose evidence before the Royal Commission on Metropolitan Sewage Discharge had been pointedly commended to the notice of the Metropolitan Board of Works by that high authority, as indicating a permanent remedy for the polluted condition of the river, and the docks, wharfs, and other riverside premises, without even ascertaining the probable cost of such permanent remedy. And,

Fifthly. Your petitioners allege that the determination of the Metropolitan Board of Works to carry into effect their scheme for the removal of the sludge from the outfalls, and for transporting it in specially-constructed steam vessels to the sea, in the neighbourhood of the Nore (from whence it may reach Margate, and other seaside resorts, to their great detriment) is opposed to the general opinion of all sanitary authorities, whilst the expenditure of large sums of money chargeable to the ratepayers for this purpose is contrary to reason, and constitutes an irregularity which ought to be restrained.

(Signed A. S. JONES.
J. BAILEY DENTON."

These are serious allegations, and seem to us to demand inquiry, either by the Royal Commission now sitting, or by some other authority.

* Between these two blocks comes the roof of the main laboratory on the first floor.

† Mr. E. Rider Cook.

‡ That is, up to the 4th of May, when these charges were sent in to Lord Herschell's Commission. Sir Henry Roscoe's reports have since been only communicated officially, we believe, to the members of two of the metropolitan vestries, those, namely, of Lambeth and Kensington, and not to the Press at all. But, thanks to Mr. Charles Hancock, F.S.S., a member of the Kensington Vestry, we were enabled a fortnight ago (see *Builder*, July 14, pp. 26–29) to publish the full text of several of Sir Henry Roscoe's reports.—ED.

THE UNEMPLOYED AND THE POOR LAW

A CONFERENCE of metropolitan Poor Law Guardians was held on Monday in the board-room of the City of London Union, Bartholomew-close, "to consider the question of the practicability, by means of the Poor Law, of adapting workhouse administration in the metropolis and larger centres to the education and training of able-bodied men in country pursuits in order to fit them for agricultural life in England or the colonies." The Hon. and Rev. Canon Legge, M.A., chairman of the Board of Guardians of the Lewisham Union, presided. The discussion was opened by the Rev. S. A. Barnett, vicar of St. Jude's, Whitechapel, and a member of the Whitechapel Board of Guardians. He maintained that the existence of a large army of unemployed was both a disgrace and a danger, and contended that the obvious course for leaders or guardians to pursue was to put the workless workers on the unworked lands. An agricultural training farm, a technical school in land work, a workfield as a supplement to the workhouse, were the first necessity. The persons selected for employment would be able-bodied men, such as seemed likely to be both able and willing to profit by the training to be given on the farm. They would receive board and lodging, and be credited with a small wage payable at the expiration of the stay on the farm. Admission would only be offered to men for whose wives and families support was assured in town, and the length of stay would be at the discretion of the superintendent; but to those who proved efficient, the offer would be made of a fixed tenure of land in England or of emigration to the colonies. Such was the bare outline of a scheme which was obviously open to many developments, but for it the claim was set up that it was practicable, and met the necessities of the case. He concluded by proposing a resolution, in which the conference were asked to recognise the fact that there are in London a large number of unemployed and unskilled workmen, and to express the opinion that unproductive land existed at home and in the colonies which labour might make productive; that it was desirable to find some means of applying the labour to the land, and that such means must be directed by the Poor Law, and supplemented by voluntary effort. The Rev. Brooke Lambert seconded the motion. Mr. A. G. Crowder (St. George's-in-the-East) proposed an amendment, expressing the opinion of the conference that the proposal was impracticable. Though he was opposed to Mr. Barnett's proposal, he was prepared to admit that some change was required in the treatment of able-bodied men by the Poor Law, and he thought there should be an extension of what might be called the Modified Workhouse-test Order lately issued to the Whitechapel Union by the Local Government Board. Mr. W. M. Acworth (Wandsworth) seconded the amendment. The discussion was continued by Mr. Fletcher (Hampstead), Mr. White (City of London), Mr. Monson (City of London), Mr. Hazell, Captain Gretton, the Rev. Llewellyn Davies (St. Marylebone), Mr. W. Brown (Lewisham), Mr. T. Catmur (Whitechapel), the Rev. Mr. Spencer (Shoreditch), the Rev. E. C. Hawkins (St. Bride's, Fleet-street), Mr. Wall (Chelsea), Mr. Thacker (Mile-end), the Rev. W. Hamilton, Colonel Grubb (Woolwich), Mr. Bannister, Mr. W. Vallance, and Mr. Allen (St. Pancras), the latter gentleman expressing his belief that during the autumn the committee in connexion with the Mansion House Fund would be able to make a start in some such scheme as that which Mr. Barnett had proposed. He, therefore, thought it would be best for the guardians to wait and see the result before they departed from the principles of the Poor Law. Mr. Barnett having replied, the chairman put the amendment, which was lost,—eight voting for, and sixteen against it. Mr. Catmur then proposed, and the Rev. E. C. Hawkins seconded, the following resolution, which was understood to be accepted by Mr. Barnett:—"That this conference is of opinion that it is desirable to appoint a committee to inquire into the prac-

ticability of applying the surplus labour of this metropolis to unproductive land at home and in the colonies, and the desirability of carrying out a scheme for this purpose under the direction of the Poor Law, and to report to a future conference." The resolution was declared carried, twenty voting for, and two against it. —*Times.*

Illustrations.

WINDOWS EXECUTED FOR RADWINTER CHURCH, SAFFRON WALDEN.

OUR illustration represents two two-light stained-glass windows, forming portion of a large series of windows in which the principal events from the Old and New Testaments are illustrated. The windows are treated principally in tones of whites, and the colours where used are tertiary and neutral, with a great variety of stains. The quaint old-fashioned wording of the texts was selected from a very old Bible by the vicar. The windows were designed and carried out by Messrs. Gibbs & Howard, of London.

THE BUILDINGS FOR THE "FACULTÉ DE MÉDECINE," PARIS.

THE present buildings for the Faculté de Médecine, of a portion of which we give a view in the present number, were commenced some years ago, from the plans and under the superintendence of Mr. Paul Ginain, to replace the buildings constructed in 1769-80, on the site of the ancient Collège de Bourgogne, for the Académie de Chirurgie. This building, which has been for a long time insufficient for its purpose, replaced the École de Chirurgie, which stood on the site now occupied by the cole National des Arts Décoratifs. The École de Médecine, a distinct institution from the last-named, was situated behind the Hôtel Dieu in the Rue de la Bûcherie, at the corner of the Rue Colbert, where are still some remains of the old buildings, especially a circular reception-room, which is threatened with destruction whenever the metropolitan railway is made.

The "Nouvelle Faculté" includes two groups of buildings, separated by the Rue de l'École de Médecine. The first, situated between this street and the Boulevard St. Germain, is devoted to the administration, the library, the anatomical museum, and the department of theoretic instruction in chemistry and physics, &c. The second group of buildings, devoted specially to the practical school of medicine and surgery, occupies the space between the streets of l'École de Médecine, Antoine Dubois, Racine, and Monsieur le Prince. It includes the professional laboratories and all services in connexion with practical anatomy, dissection-rooms, theatres, &c, and the museum of pathological anatomy.

The façade of which we give a view is that towards the Boulevard St. Germain. The new design has a certain reference to, or reminiscence of, that of the existing École de Médecine. As will be seen, it is in a very severe style—much more so than would be approved of at present in this country; but it has, at all events, more architectural dignity and refinement than our last medical building on the Thames Embankment.

THE STEEPLE OF ST. MARY-LE-STRAND.

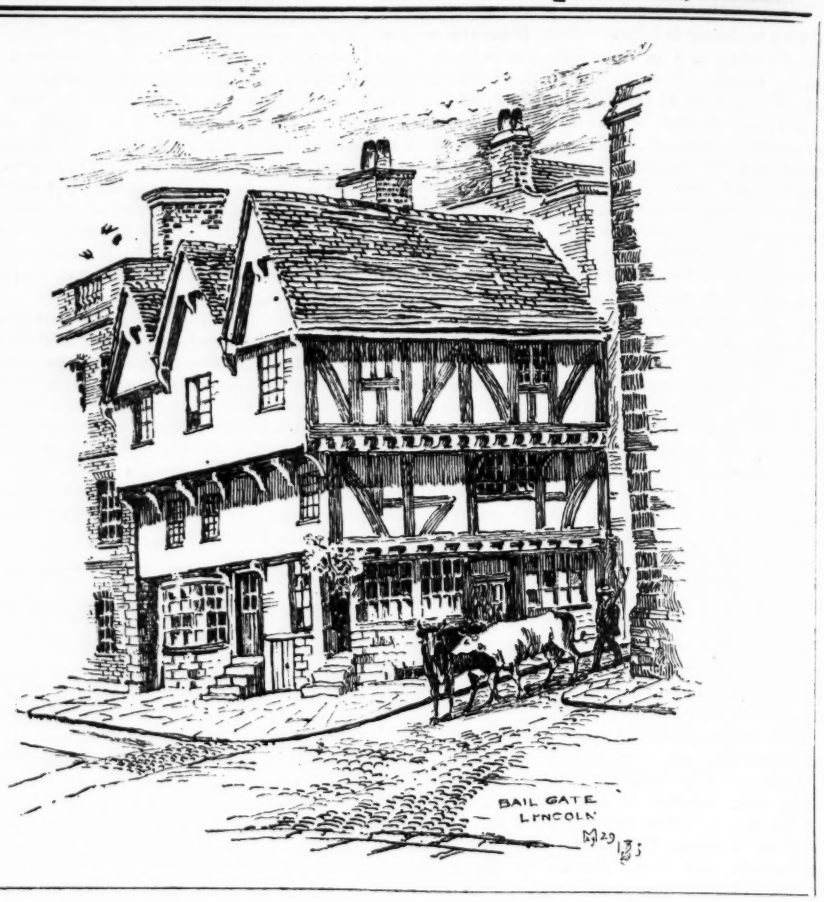
As various foolish persons have been clamouring for the removal of the Church of St. Mary-le-Strand, it seems opportune to put on record a measured drawing of its graceful steeple, as a practical protest against its removal, or a memorandum of it if it should be removed, which, however, we think public opinion of the better sort will hardly permit.

The church was built from the designs of Gibbs in 1714–17. The details, of course, are in the taste of the time, and are not to be altogether defended, but the general design is very good.

The steeple is drawn by Mr. Thos. J. Ketchlee, from measurements by himself and Mr. J. Hutchings.

ILLUSTRATIONS OF THE FORTH BRIDGE.

WE give two illustrations showing the recent progress of the Forth Bridge work, reproduced from photographs kindly lent to us by Mr. B. Baker from the extensive collection of photographs of every stage of the work which the engineers have been making since the commencement. These photographs date about eleven weeks back.



The first view gives a very good idea of the appearance of the whole work as it is approached from the south, or Queensferry side, of the Forth, with the three enormous piles known as Queensferry pier, Inchgarvie pier, and Fife pier, standing in a line across the Forth; and the view gives a vivid idea of the immense gap still to be bridged by the cantilevers and the straight bridge in the centre, and some idea of the scale of the work in relation to the surrounding landscape. The second view shows a portion of Inchgarvie pier on a larger scale. At the lower right-hand corner is seen the compression member of the cantilever as far as completed; the end piece shows the change in direction after the junction with the first tension tie. Just above this tube is seen the first tension tie nearly completed, and the stage or scaffold from which it is built, and which is supported on it and shifted down with it as the work proceeds. The reader should follow this member with his eye up to the junction with the top of the vertical tubes, and realise that this member has been built downwards, from that point to its junction with projecting cantilever tube, from the platform which is now seen on the lower part of the tie, and which has been moved downwards by shifts as the work proceeded. To the right, at the top of the picture, can be made out the figures of two men in the act of sliding down steel wire ropes on to the platform seen at the top of the vertical cross-braced pillar, and these shadowy figures will give the scale of the structure. The upright on to the top of which the men are descending is no part of the permanent structure, but is one of the temporary pillars shown in our diagram published in the *Builder* for February 11 of this year, and which are built up to give support to the top members of the cantilever until it is carried out to the point where the first tubular strut from the lower member will support it. This strut is seen half-completed in the large-scale view. The second strut would be built from the foot of the tension tie, not yet attached in this view; in the general view the commencement of one of the second struts may be seen on the left hand, or north side, of the Queensferry pier.

At the top of the large-scale photograph is seen the commencement of the top member of the cantilever hanging out into the air. At the top of the two main vertical tubes are seen two of Mr. Arrol's rivetting cages, which have also moved up, supported on the tube, as the work went on. The oblique tube at the bottom left-hand side of the picture is one of the great cross-bracing tubes between the uprights, the ends of the two others are seen at the top. The Inchgarvie pier is a great deal wider between the vertical members than the two other piers, having to take two cantilevers with no support on *terra firma* at either end, and therefore a broader base was considered desirable.

We hope the illustrations, though we admit they are not architecturally beautiful, will serve to give to those who have not seen the work a better idea of its scale and extraordinary character than mere words can convey.

We may mention, in connexion with the subject, that Messrs. Grant & Son, of Princes-street, Edinburgh, have on sale a considerable collection of photographs of the bridge in various stages of its progress, of which they have sent us some very good specimens; they also publish a pamphlet giving what seems to be a good popular account of the work.

OLD HOUSE, BAIL GATE, LINCOLN.

FOR this sketch of a picturesque old house at the corner of a street in Lincoln we are indebted to Mr. F. D. Bedford.

ABOLITION OF THE JURISDICTION OF AN ANCIENT COMMISSION OF SEWERS.

THE powers of the Honourable the Havering and Dagenham (Essex) Commissioners of Sewers, so far as relates to the Borough of West Ham, have been transferred to the Corporation of that borough. The Commission dates from the time of Henry VIII., and had control of the ditches and river walls along the Essex Marshes, from Walthamstow to Rainham Creek. The newly-constituted Corporation of West Ham (1886), feeling that the powers of the Commissioners were inconsistent with the changed circumstances of the district, promoted a Bill in Parliament to extinguish their powers within the limits of the borough. The Bill was strongly opposed by the Commissioners, who contended that such a proceeding was without a precedent in Parliament. The matter was fought for several days before the Select Committees of the Commons and Lords. On behalf of the Corporation, engineering evidence was given by Messrs. Lewis Angell (Borough Engineer), Sir Robert Rawlinson, Sir Alex. Rendel, and the engineer of the Lea Conservancy; and on behalf of the Commissioners by their engineer, Mr. Barnes, and Mr. Abernethy. In the result, both the Lords' and Commons' Committees passed the Bill abolishing the powers of the Commissioners within the Borough of West Ham.

LANES, COURTS, AND BACK STREETS IN OLD CITIES AND TOWNS, EXEMPLIFIED BY THOSE IN CARLISLE.*

THE City of Carlisle is one of the most ancient towns in the kingdom. The earliest charter on record was granted by Henry II., and there is a regular series of charters from that date down to the reign of Charles I. Eight lines of railways converge on Carlisle. The area of the city is 2,029 acres. The population is estimated at upwards of 40,000. The rateable value of the city in 1877 was 107,151*l.*; it is now 152,332*l.*, showing an increase of over 42 per cent.

The city is built on the main west road from England to Scotland, and is almost surrounded by the rivers Eden on the north and the Caldew and the Petteril on the west and east sides of the city, the two latter rivers being only three-quarters of a mile apart at the south of the city.

A glance at John Speed's map, taken from his "Book of the British Empire," published in 1610 and reprinted in 1676, shows that the King's highway from north to south, and the road to the west, formed the principal streets in the city at that time. All the houses abutted on these highways, with extensive gardens running from the houses to the city walls. No such thing as a court is shown on the plan, and only a very few narrow secondary streets and lanes from one main road to another.

It would appear from Speed's map that formerly the city elongated itself on its main thoroughfares in the same manner as I have read that some of the cities in China are built. This must have been an advantage for the inhabitants, as they would be in touch and sight of all that passed through the city, or had business in it. Then again, the gardens would give abundant air space.

The author exhibited a small plan of the centre of the city, showing the amount of open space the inhabitants enjoyed in 1610, as compared with the small portion of open space now left, and from which it was observable that the amount of open space at the time when Speed's map was made was over fourteen times greater than the houses, and that now on the same site there are only 292 square feet of open space for thirty-eight houses, or buildings that have been used for houses, giving an average of only 7·68 square feet per house.

These lanes contain stables, second class public-houses, beer-houses, lodging-houses, labourers' cottages, cottages converted into warehouses, and, until a few months ago, almost all the slaughter-houses were in them, and generally placed at the end where the lane is a *cul-de-sac*. The lanes are over-crowded, unventilated, and often have in them back-to-back houses, or, at most, a small space exists of 15 to 18 inches wide for eaves' drop between the two properties, on the bottom of which is frequently deposited rubbish of a very objectionable and insanitary character.

These lanes and courts are principally occupied by hard-working labouring men, who ought to have the greatest possible amount of air space, instead of being compelled to crowd together until they have no pure air to breathe, and who must return to their work in the morning unrefreshed, and greedy to fill their lungs with a purer air than that breathed through the night.

During the last epidemic of fever in the city—in 1874—Mr. Power, Local Government Board Inspector, found that typhus located itself in forty-two lanes, courts, and narrow streets, and one broad street, with back-to-back houses in it and courts behind approached by narrow, built-over passages from the street.

Annet-square, at the north of the city, and East-street (a *cul-de-sac* approached from Botchgate by a covered archway at the south), are the localities where typhus first established itself, and these two places to the north and south of the city, and half a mile apart, are the two places the fever radiated from in various directions. It is true that since 1874 improvements have been made in these lanes and courts, but still the lanes and courts are the most favourable fever-breeding places in the city, and they are always more or less unhealthy, and during an epidemic of fever it spreads from them through the city.

Now, if circumstances had allowed the city to develop itself, by following the plan of building houses abutting on the highways through the city only one deep, there would not have been such a great want of open space as at present; but being a fortified city, it must needs make room for the increase of its population by crowding buildings on the gardens and open space within the city walls, and unfortunately, until the first Public Health Act was applied, following the same plan outside the city walls. The courts and lanes are a legacy left to the city that is not favourable to its healthiness. It is neither right, humane, wise, nor profitable to any city or town to have these confined lanes and courts crowded with inhabitants, and to neglect to help them.

The courts and lanes in Carlisle vary very much in their character and the number of inhabitants; they contain from two to upwards of thirty tenements. The front streets have courts and lanes at the back of them in every respect similar in constructlon, some of which are kept very clean and in a good sanitary condition, and are occupied by good tenants, whilst others are in a dirty, uncared-for, insanitary state, and it is almost impossible to walk up the alleys or passages of the latter lanes and courts without stepping into excrement and all manner of filth. As may be expected, the inhabitants, as a rule, in these insanitary courts are undesirable tenants in every sense of the word. Should an epidemic of fever or cholera at any time occur, it would be difficult to free the city of it if these insanitary courts and lanes remain in their present neglected condition. The sanitary state of these courts and lanes undergoes considerable temporary improvement when the owners and tenants are afraid of a threatened epidemic, but after the scare is over they are soon in as bad a sanitary condition as ever.

Almost invariably when the owners live in the neighbourhood and look after their own property, or give full power to their agents, the courts and lanes are kept in as good a sanitary state as it is possible with their limited air space to keep them; but when the owners are non-resident, and their agents are not empowered to do anything but receive the rents, the properties are in an uncared-for condition throughout; the houses, gullies, water-closets, surface of court, and everything else, are uncleansed, and often considerably out of repair. The Old North and South Roads have seventy-four lanes and courts leading out of them, with an average population of fifty-six in each lane or court. The Old West Road has forty-four courts and lanes leading out of it, with an average population of thirty-eight in each lane or court. The Old East Road has nine courts in it, with an average population of forty in each court. These roads are the principal thoroughfares and business streets at the present time.

The comparative population in the main roads through Carlisle, and in the lanes and courts from them, is as follows:—The Old North and South Roads have only a population of 26 per cent. of that of the lanes and courts leading out of them. The Old West Main Road has only a population of 58 per cent. of that in the courts and lanes leading out of it. The Old East Road has only a population of 66 per cent. of that of the courts and lanes on it. The average population in the old main roads is only 48 per cent. of the population of the lanes and courts leading out of them. The remaining streets in the city having courts and lanes leading out of them have a population of 156 per cent. of that of the courts and lanes in them. The average population of all the front streets in the city having courts and lanes leading out of them is only 97 per cent. of that of the population in the courts and lanes in them.

The total number of streets, lanes, and courts in the city which have houses in them, is 669, of which 271 are front streets, 300 lanes and courts without thoroughfares, and 98 lanes and courts which are thoroughfares, or say 40 per cent. of front streets, 15 per cent. of lanes and courts with thoroughfares, and 45 per cent. courts and lanes without thoroughfares.

There are 84 front streets (or 31 per cent. of the front streets) which have courts and lanes leading out of them, and in these 84 streets there are 398 lanes and courts. There are also 38 back streets which have only the rear of houses abutting on them, and which make the number of private back streets, lanes, and courts 436. The population of the lanes and courts and back streets is 13,218, being one-third of the total population of the city.

Municipal engineers and surveyors should do all they can to do away with these dwellings, unfit for human habitation, in courts and lanes, because if they are allowed to remain they will be a source of trouble and danger to the health and moral condition of the cities and towns in which they exist.

* From a paper by H. U. McKie, M. Inst. C.E., City Surveyor of Carlisle, read at the annual meeting of the Association of Municipal and Sanitary Engineers and Surveyors, recently held in London.

THE GREAT NORTHERN CENTRAL HOSPITAL.

THE first portion of the buildings for this hospital, situate in the Holloway-road, between Manor-road and Grove-road, were opened about three months ago for the reception of patients, and they were formally opened by the Prince and Princess of Wales on the 17th inst. They constitute about one-half of the complete hospital, and comprise three wards, a portion of the administration department, the out-patients' department, and the mortuary. The wards are placed in a three-story pavilion, and accommodate twenty patients each. Attached to the wards on each floor are a ward kitchen and small ward for one bed; also stores for food, clothes, linen, &c. Each ward is 87 ft. 9 in. long, 29 ft. wide, and 13 ft. 6 in. high; total area, 2,552 ft.; total cubic space, 34,354 ft. The wall space per bed is 8 ft. 6 in.; floor area per bed, 127 ft.; cubic space per bed, 1,614 ft. 6 in. The chief means of ventilation are the windows, which are placed alternately with the beds on each side of the wards. In addition, air gratings are provided close to the floor level at the back of each bed, and extraction shafts are taken up alongside the smoke-flues from the upper part of each ward. Each ward is warmed by two pairs of Boyd's Hygiastic grates, set back to back in the centre of the ward, and having descending flues which run in the thickness of the floor to the outside walls, where they ascend. Two rows of hot-water pipes run around each ward to aid in warming when necessary.

The water-closets, bath-rooms, lavatories, &c., are placed in a projecting building, connected to the wards by low covered-in bridges, provided with cross ventilation.

The floors throughout the ward pavilions are constructed of fire-proof materials. The ward floors are laid with oak blocks, wax polished. The roof of the ward pavilion is flat, and paved with asphalte; it will be used as a promenade for patients. Patients will also be enabled to take the air on the covered balconies at the ends of the wards.

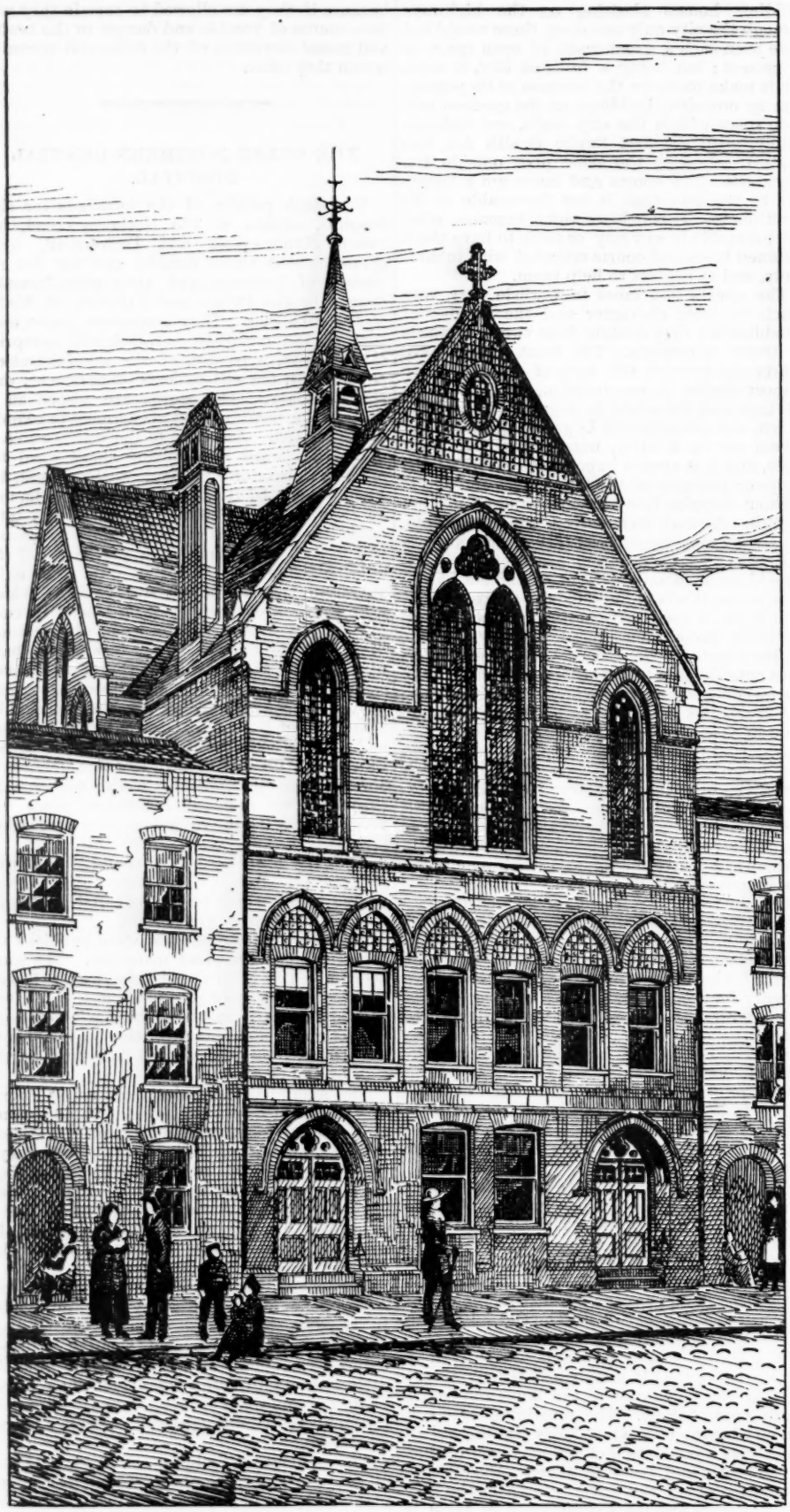
The administration block comprises secretary's office (temporary), stores, dining-rooms for nurses and staff, surgery, rooms for resident staff (temporary), board-room (temporary), operating theatre with rooms adjoining, kitchen offices, and servants' dormitories. There are two lifts for food and coals, and a passenger lift, all of which are worked by hydraulic power. The kitchen is fitted with gas and steam-cooking apparatus.

The out-patient department is an entirely separate building, one story only in height. It consists of a large central waiting-hall, around which are grouped smaller waiting-rooms for new patients; four consulting-rooms, each with its private room attached; a dark-room for ophthalmascope work; and a dispensary, with waiting-room attached, drug stores, &c.

The mortuary building contains a dead-house, mortuary chamber, *post-mortem* room, pathologist's room, and small museum.

The cost of the buildings when completed (omitting out-patient department) will be, for 150 beds, about 260*l.* per bed; and of the furniture, as far as at present completed (except the out-patient department), about 30*l.* per bed. The architects point out that in looking at the cost of the building per bed, it must be remembered that of the total number, more than thirty will be in single rooms, an arrangement which greatly increases the relative cost, as compared with hospitals whose wards contain from twenty to thirty beds each.

The following figures, supplied by the architects, will show that the cost of this hospital is by no means extravagant:—Herbert (Woolwich), 330*l.* per bed; Blackburn, 286*l.* per bed (including out-patient department); Leeds, 298*l.* per bed (ditto); St. Thomas', 969*l.* per bed (ditto); Edinburgh, 477*l.* per bed (ditto). With the exception of Edinburgh, the figures given are all upwards of twenty years old, and as the rise in prices cannot be taken at less than 20 per cent., the comparison



New Church, Club, &c., for the Parish of Holy Trinity, Bethnal Green.
Mr. R. J. Lovell, A.R.I.B.A., Architect.

is the more favourable to the Great Northern Central Hospital.

The architects of the hospital are Messrs. Young & Hall; and the builders are Messrs. Brass & Son.

We gave a view and plan of the complete building in the *Builder* for Dec. 25, 1886.

New Wall-paper Printing Machine.—A Danish engineer, Herr S. Hansen, has invented a machine for printing various colours on wall-paper simultaneously, instead of, as is now the case, only one colour at each impression. The secret of the process is retained by the inventor, who has obtained a ten years' patent right for his machine.

THE CHURCH OF HOLY TRINITY, OLD NICHOL STREET, BETHNAL GREEN.

THIS building is being erected for the parish of Holy Trinity, Bethnal-green, and is the commencement of a scheme proposed to be carried out by the Vicar. It contains on the ground-floor a club-room, about 45 ft. by 30 ft. for the use of the men of the parish, with a platform at one end. A caretaker's room, with bed-room, &c., attached, is also on this floor. On a mezzanine floor are vicar's rooms, and upon the whole of the first floor is the church, which is approached by a stone staircase 4 ft. by 6 ft. wide. The basement contains a large gymnasium about 45 ft. by 30 ft., and 14 ft. high, and in the front portion are kitchen, stores, &c. The construction is fire-proof throughout, on Messrs. Homan & Rodgers' system. The club-room, which is 20 ft. high, will have a dado of glazed bricks, and picked stocks above. The floors throughout will be covered with pitch-pine blocks. The foundation-stone was laid on Saturday, the 7th inst. by the President of Magdalene College, for and on behalf of H.R.H. Princess Christian, who had promised to perform this ceremony, but was prevented by the Court being in mourning. Magdalene College has been a liberal subscriber to the funds, and sustains a successful mission in connexion with the church and parish. Messrs. Perry & Co., of Bow, are carrying out the work, under the direction and superintendence of the architect, Mr. Richard J. Lovell, A.R.I.B.A.

THE METROPOLITAN BOARD OF WORKS INQUIRY COMMISSION:

FURTHER EVIDENCE.*

MR. EARLE BIRD, examined by Lord Herschell, the Chairman of the Commission, said he was the owner of an estate in Albany-road, Camberwell. He entrusted the laying-out of the estate to Mr. Robert Evans, a surveyor, whose plan, showing the proposed roads, was sent in to the Board for approval. But there were difficulties in getting it passed by the Board, so witness employed Mr. Fowler and Mr. Saunders, members of the Board, to advise him in the matter. He asked Mr. Fowler to overhaul the whole of the plan, and to ascertain why it had been rejected. Mr. Fowler made a tracing showing a proposed alteration in the plan. Ultimately the plan was passed. Mr. Saunders made no plan. Witness paid Mr. Fowler 50*l.* and Mr. Saunders fifty guineas, for "he considered they had done him good, and enabled him to pass his plans." He employed Saunders "to make the thing thoroughly safe."

Mr. Frank Hards, an auctioneer and surveyor, of Greenwich, was next examined, and substantially admitted the correctness of the evidence given by the witness Bradly, an *employé* of the Board,† as to their joint speculations in lands subsequently acquired by the Board for public purposes.

Mr. Frederick Gordon deposed that he tendered in 1877 for the plots in Northumberland-avenue upon which the Grand Hotel now stands, and he and his co-partners, Mr. Alexander Gordon and Mr. Davies, afterwards obtained an agreement from the Board with regard to that land. No one else was interested in that agreement at that time, but it was afterwards assigned to the Grand Hotel Company, or, rather, to another company at first, which afterwards became the Grand Hotel Company, of which witness was Chairman. Mr. Saunders was jointly employed as architect with Messrs. F. & H. Francis. The next site which he (witness) took was that on which the Hôtel Métropôle is built. He was also chairman of the Hôtel Métropôle, Limited. Messrs. Francis and Mr. Saunders were also joint architects of that building. Witness purchased the freehold of the site of the Hôtel Métropôle at twenty-six years' purchase, and afterwards sold it for twenty-eight years' purchase, making a profit of two years' purchase, or 12,000*l.*, which went into the assets of the Métropôle Company. No one connected with the Board of Works received a sixpence of that profit. Cross-examined by Mr. Winch, Q.C., for the Inquiry Committee, witness said that he and his partners had built the Holborn Restaurant, the First Avenue Hotel, Holborn, and the Royal Forest Hotel, Chingford. The latter was built on property belonging to the Corporation of London. Neither the Holborn Restaurant nor the First Avenue Hotel were built on land belonging either to the Corporation or to the Metropolitan Board of Works, and for neither of these two buildings was Mr. Saunders employed as architect, but he was consulted with regard to questions of light and air in connexion with each of them. He found that the sum of 7,128*l.* 17s. 6d. was paid to Messrs. Francis and Saunders by way of professional charges due to them as architects of the Grand Hotel. Saunders presumably got half that amount. Did not know how much work Mr. Saunders did with regard to the plans of that building. Witness had nothing to do with

* For summary of previous evidence see the *Builder*, pp. 8, 44, *ante*.

† See *Builder* p. 45, *ante*. At the last meeting of the Board, Bradly was dismissed.

Mr. Fowler in the matter. With regard to the Hôtel Métropôle, the payments to the architects amounted to 2,867*l.* Mr. Grenfell, one of the Commissioners, asked whether this sum went half to Saunders and half to Messrs. Francis. Witness replied in the negative, and explained that there was a considerable difference in the way in which the Grand was erected and the way in which the Métropôle was erected. Witness and his co-partners were practically their own builders in the case of the Métropôle. They employed a very able clerk of the works, and they themselves purchased the whole of the material required in the erection of the building. They, therefore, considered that, under the circumstances, the architects were not entitled to the same rate of remuneration as they would have been entitled to had they had the entire responsibility of superintending the erection of the building by an ordinary contractor. Therefore, witness and his co-partners only paid to the architects what appeared to be a very much smaller sum in comparison with that paid in connexion with the building of the Grand Hotel, although the Métropôle, of the two, was the more expensive building. The 2,867*l.* was to be divided between Saunders and the Messrs. Francis, with the exception that there was 52*l.* 10s. paid to Saunders in connexion with the assessment, for going before the Assessment Commissioners with regard to the assessment for rating, and also a separate fee of 150 guineas paid to Saunders for "various interviews and information as regards the site generally" prior to the commencement of the works. Asked what Saunders did for this fee, witness said he measured the site, and added that "there was really a great deal of work done for that money." Witness said he wished to state that, though the transactions in which he had been concerned with the Board had been very large, he had never been asked for anything by any *employé* of the Board, nor had he ever paid anything. Examined by Mr. Bosanquet, Q.C., one of the Commissioners, witness said he believed that Saunders was the first person who introduced the site of the Hôtel Métropôle to him. He was certainly the first person connected with the Board who mentioned the matter to him.

Mr. Frederick John Francis, F.R.I.B.A., said that his firm (F. & H. Francis) were architects jointly with Mr. Saunders for both the Grand Hotel and the Hôtel Métropôle. The joint employment on the Grand Hotel commenced at about the same time. The plans were chiefly prepared in his (witness's) office, by himself and his assistants. Mr. Saunders, however, did some things in connexion with the plans. They were jointly responsible for the superintendence of the erection of the buildings. A clerk of works was employed, and witness and his brother did the chief part of the work in supervising the erection of the building. Mr. Saunders no doubt went there sometimes, but there was no arrangement that he should supervise one part of the work and witness and his brother the other part. In fact, witness and his brother supervised the work as much as they would have done if there had been no other architect associated with them. His (witness's) appointment as joint architect of the Hôtel Métropôle commenced about the samé time as that of Mr. Saunders. Asked who prepared the designs for the Métropôle, witness said he believed Mr. Gordon asked both witness's firm and Saunders each to prepare an elevation. When the elevations were made, those presented by witness's firm were preferred, and carried out. The internal arrangements were chiefly planned in witness's office, but many of the details were worked out by Mr. Gordon himself. Mr. Saunders assisted in the preparation of the plans, partly at witness's office, and partly by making tracings of drawings sent to him at his own office for the purpose. In regard to the supervision of the erection of the Métropôle, witness and his brother took charge of it, though, owing to the special circumstances described by Mr. Gordon, it was only necessary to give partial supervision to the work, and that was the reason why the remuneration was less than in the case of the Grand Hotel. He believed that Mr. Saunders's name, as well as that of witness's firm, was on the plans when they were sent to the Board. Witness's firm had a similar arrangement with Saunders, in regard to halving the professional remuneration *in re* the Métropôle, as was made in the case of the Grand Hotel. Cross-examined by Mr. Winch, witness was asked, in reference to the Grand Hotel, whether he received any material assistance from Saunders in the work. Witness said that was rather an invidious question, but he did not think that Saunders did anything but what he (witness) and his brother could have done just as well. Mr. Saunders certainly did not do very much with regard to the plans of the Grand. Witness thought that Mr. Gordon came to witness's firm first about the Grand Hotel, but he thought he had spoken to Mr. Saunders also. The application to the Metropolitan Board of Works for the land was made by witness's firm at Mr. Gordon's request. When they made application for the land they knew that Saunders was to be associated with them as joint architect. The agreement was that if they applied for the land, and got it, Saunders was to be joint architect. Saunders had been joint architect with them in no other buildings. Examined by Mr. Meadows White, Q.C., senior counsel for the Board, witness said he had never had any transactions with any other member of the Board, nor with any official of the Board. Every interview connected with the plans of the Grand and the Métropôle was with Mr. Vulliamy himself.

Mr. George Brick, a builder, gave evidence as to his employment in connexion with property in Lisson-street, Paddington. He said he was instructed by Miss Booth (of the "Salvation Army") the owner of No. 33 in that street to pull down the property. After the house was pulled down, there was an old fissure manifest in the party-wall between what had been No. 33 and the adjoining house, No. 35. There was a notice served on the owner of No. 35 by the then District Surveyor (Mr. Peebles), who was of opinion that No. 35 was a dangerous structure, and who called upon the owner to take down the defective portions of the party-wall in question. The owner of No. 35, and of the house beyond, No. 37, was Mr. Brown, a member of the Metropolitan Board of Works. Witness called on Mr. Brown after the District Surveyor's notice had been served. Brown told witness to mind his own business, and said, "We will see about this in a day or two. I will bring somebody who will see into the matter." A few days later Mr. Brown came with an officer from the Board,—Mr. Thomas, of the Dangerous Structures Department. Mr. Thomas expressed the opinion that the fissure in the wall was an old one, and said he thought the wall would "hang together for a long time." He further said that he could not see why it should have been condemned. Witness proceeded, according to the District Surveyor's notice, to shore up the wall, and did so to the satisfaction of the District Surveyor, Mr. Peebles, who, however, seemed rather vexed when he heard that Mr. Brown had brought Mr. Thomas to see the wall, and found that the dangerous parts of the wall had not been taken down by Mr. Brown. Ultimately, the dangerous part of the front wall was shored-up by the Board's contractors, Messrs. Greenwood. The shore put up by them was to the front wall of the house, not to the party-wall.

Mr. George James Thomas said he was Superintendent of the Dangerous Structures Department, under the Superintending Architect of the Board. He had been about ten years at the head of that department. He made an appointment with Mr. Brown to see the property in question, as Mr. Brown wished him to point out what should be done in the matter. Witness consulted Mr. Vulliamy before going to see the property. When he had seen the property, he advised Mr. Brown to consult an independent architect, as there seemed to be a likelihood of litigation. He went to the property subsequently in order to see if the work of shoring had been done. If an order on a property-owner to do work of this kind was not complied with, the usual course, when the District Surveyor reported that the work had not been done, was to mark the report for summons. That was done in this instance, and the report was sent to an assistant in the inner office, whose duty it was to make out the summons; but before the summons was made out, Mr. Brown called at the office, and it was then that witness saw Mr. Vulliamy, who requested him to go and look at the premises. He went, and reported to Mr. Vulliamy that though there was a largish fissure in the party-wall at its junction with the front-wall of the house, he thought there was no immediate danger pending the negotiations which were in progress with the "Salvation Army" (who were the owners of No. 33, the house which was first pulled down). Subsequently there was litigation between the parties, and witness was subpœnaed as a witness. With the single exception of advising Mr. Vulliamy that there was no danger in granting delay, witness had taken no part in the affair, had no interest whatever in it, and had not sought to influence anybody in the matter.

Mr. Frederick Gordon, recalled, said he wished to add to his previous evidence that there was a further sum paid to Messrs. Francis and to Mr. Saunders jointly in respect of the annexe to the Grand Hotel, which was built some time after the main building was erected. That sum amounted to 1,400*l.*, being the ordinary architects' commission on the work carried out. Of that sum 700*l.* would, presumably, go to Mr. Saunders.

We must break off here for the present.

TELEPHONE AND STREET FIRE-ALARM COMMUNICATION AT HORNSEY.*

THE importance of connecting by telephone the depôts, fire stations, and offices of the Hornsey Local Board, was recognised about three years ago, and the first contract was entered into with the General Post Office for connecting the Board's offices and the Central Fire Station by telephone. The wires were carried on poles along the public roads, the distance being about 2,900 yards, and a further extension of the system was undertaken by the Post Office. The poles and overhead wires were very strongly objected to by the residents along the route; and so successfully was the opposition maintained, that the Post Office authorities were unable to obtain wayleave for the intended extension of the overhead system. Therefore the Local Board ultimately resolved (with the consent of the Post Office authorities) to remove the poles and overhead wires, and to lay down a complete system of pipes for telephonic and street fire-alarm purposes.

The pipes were laid by the Local Board, and were of 2 in. cast-iron, with turned and bored joints, weighing 23 lb. per lineal yard, and coated with Dr. Angus Smith's composition. All pipes were carefully tested to a pressure of 130 lb. before leaving the works, and were again tested and examined on delivery at the Board's depôt. No variation in weight exceeding one per cent. was allowed. The contract for the pipes was executed by the Staveley Iron Company in a very satisfactory manner, at the rate of 4*l.* 12s. per ton, delivered. The total length of pipe laid was 13,948 yards.

The pipes were laid by contract. The cost for opening ground, laying the pipes at a depth of not less than 2 ft., including red lead used in jointing and filling in, and making good surface, was 11½d. per yard lineal. The price did not include the relay of footway paving or the cartage from the depôt.

Examination pits were constructed on the line of pipes at distances of about 100 yards. The pipes were laid, as far as practicable, in straight lines between the pits, and sunk examination boxes were fixed, in most cases midway between the pits, or where a curve or bend occurred. The boxes were of cast-iron, weighing 86 lb. each, and were made in two castings, with turned and bored joints and india-rubber washers. The cost of each box delivered complete was 10s. The brick pits measure in the clear, 2 ft. by 1 ft. 6 in. by 2 ft. 3 in. deep, and were constructed of London stock bricks in cement. The pits were covered with two kinds of cover, one wholly of cast iron for the footway, the other being a stronger casting, with wood-blocks for the carriage-way. The brick pits, including cartage and fixing covers, cost 1*l.* 2s. 6d. each. The covers were supplied by Messrs. Smith, Patterson & Co., the footway covers costing 10s. 6d. each, and the roadway covers 16s. 3d., delivered at Hornsey.

The electrical apparatus, batteries, wires, fittings, &c. (with the exception of the telephone instruments), were provided and fixed by Messrs. Blenheim & Co., the total cost being 519*l.* 10s. 6d. The wire used was No. 16 B.W.G. copper, of not less than 95 per cent. conductivity, insulated with gutta-percha to No. 7 B.W.G., and braided and ozokerited.

The telephone instruments are of the Gower-Bell type, and were purchased by the Board free of royalty, and, including the three rented from the Post Office and one from the United Telephone Company, number fourteen in all.

* From a paper by Mr. T. de Courcy Meade, Assoc. M. Inst. C.E. (Engineer and Surveyor to the Hornsey Local Board), read at the recent annual meeting of the Association of Municipal and Sanitary Engineers and Surveyors.

There are three exchange switch-boards, from which the lines branch, and by means of which any point on the system can be connected with any other point. The switch-boards are worked entirely by firemen, who are on duty both night and day. The system is maintained by two exchanges at a time. The switch-boards are made of different sizes, varying according to the number of lines to be dealt with. In each line is placed a coil of wire containing a magnetic needle (very similar to an ordinary needle telegraph). One end of the coil is connected to the line, and the other to a plug. When in position the plug is placed in contact with a horizontal brass bar connected with earth. The magnetic needle is supported on a steel spindle, from which is suspended a small brass disc. One end of the needle terminates in a platinum point, which is suspended immediately over a cup containing mercury. The following is the method of signalling—viz.:—On contact being made by pressing the button of the telephone instrument of a distant station, a current of electricity is sent through the line, and hence the magnetic needle of the particular coil on the switchboard is deflected, and the platinum point dips into the mercury cup as before described. This makes the contact, and a current passes from a local battery and rings the call-bell; the deflection of the needle moves the disc behind a glass panel, and indicates the particular line from which the call is received. The plug, attached to a flexible insulated cord, is disconnected from the horizontal bar and placed in contact with a circular brass plate, which is in connection with the local instrument. A conversation is then held by the telephones in the usual way. Should the persons signalling require to speak to any other branch line outside the switching station, they ask the person on duty at the station to connect them with the third or fourth instrument as required. This is done by placing the plugs on the insulated cord connected with the instruments in one of the single brass plates immediately under the horizontal brass bar.

The Board's telephones are worked by single wires with an earth circuit; the Post Office instruments are worked with a metallic circuit. In joining the insulated wire both skill and care are absolutely necessary, as a badly-made joint might cause much inconvenience. In drawing the wires into the pipes care is also necessary. When the pipes were laid a "lead wire" of ordinary galvanised wire, No. 12 B.W.G., was run through, for the purpose of drawing the insulated wires into the pipes, but when additional or new wires are required, the existing insulated wires can be used for the purpose.

Fire alarms are placed in the streets in convenient positions, and are defined by special lamps with ruby glass. These posts number twenty-three in all, and are fairly dispersed throughout the district. Each post is fitted with a glass panel, which is left to the care of the public, and up to the present time there has been no tampering with the posts, nor has there been a single instance of wilful false alarm of fire. In this respect our system differs from that in the Metropolis, where all posts are placed under the charge of the police at "fixed points." Owing to this deviation from the Metropolitan system, the Board provided numbered keys and master keys to the post locks. By this arrangement an iron panel could be placed in the door in lieu of glass, and the numbered keys served to the residents in the neighbourhood of each post. The keys would, on opening the door of the post, be retained in the lock until released by the fireman's master key, and in this way any false alarms would be detected; but, as previously stated, no false alarms have been received, therefore the glass panels are still in use. The signalling apparatus in the street alarm post consists of a coil of insulated wire of a definite resistance. Seven or eight posts can be placed on a single wire. The coil in the first post offers a resistance of, say, ten units; that in the second, fifteen; the third, twenty, and so on through the whole series. The front of the post is fitted with an iron door and glass panel, inside which is a metal disc, with a projecting knob near the centre. At the back of the metal disc is a straight brass spring, with which contact is made by pulling out the knob. This rings a bell at the fire-station, and the alarm is acknowledged by ringing a small gong in the post which is attached to the back of the metal disc. The knob is automatically locked when drawn out, and can only be released by the fireman's master key. By the aid of this key a private code of signals can be transmitted between a fireman at the post and those at the fire-station. The posts are at present worked on the open-circuit system. Every post is tested by the firemen once a week. The whole system of alarms in connexion with each station is worked by a battery of four cells.

The batteries used are somewhat similar to the Leclanché battery, but larger, and the carbon mixture is placed on the outside of the porous pot with the zinc cylinder inside. The liquid used is a solution of sal-ammoniac. Four cells are generally used throughout the system for ringing the bells and working the telephone instruments. This number of cells is also sufficient to work the fire alarm switch-boards as before described. For these batteries Messrs. Blenheim & Co., the manufacturers, claim that they have a less internal resistance and continue in action for a greater length of time, also that they recover in shorter time than the Leclanché battery.

QUESTIONS OF BUILDING LEGISLATION.

SIR,—In the course of the Metropolitan Board of Works inquiry, Lord Herschell has

1. Given his opinion of the meaning of the judgment of the House of Lords (in which he himself took part) in the important De Vere-gardens line of frontage case.

2. Has explained that until the superintending architect has defined a general line of frontage in each particular case, the offence of projecting beyond the general line of frontage cannot be committed, because there is nothing to project beyond.

3. Has given his opinion that the words "used wholly or in part for the purposes of trade or manufacture" apply to shops used for retail trade.

As these opinions and explanations touch very important matters, and Lord Herschell being an Ex-Lord Chancellor (and, as a judicial member of the House of Lords, a present Judge), I should be glad to hear from some of your lawyer readers whether these utterances could be quoted in a court of law as any other opinion of a judge could be quoted when given *ex cathedrâ*, and in the course of judicial proceedings. More especially is it interesting to know this, as No. 2 is somewhat startling, and No. 3 quite contrary to the practice of the past thirty-two years.

A. H.

SCHOOL BOARD TENDERS.

SIR,—The School Board for London have been inviting tenders for heating the Amiens-street school, Battersea, and I am perfectly amazed to find the highest tender 1,740*l.* and the lowest 440*l.*—only a difference of 1,300*l.*! I ask, how can this be? Can the same specification and plan have been given to each of the eleven firms who tendered? and further, will the School Board Inspector of Works see that the work is carried out (for the 440*l.*) in the very best possible manner, both as to quantity and quality of materials, also workmanship, before the account is certified? I am quite in favour of honourable competition, but this instance is beyond a joke. Several other well-known names appear in this competition, whose amounts vary from 850*l.* to 1,000*l.*, showing the absurdity of the lowest.

I shall be glad if any of your readers can throw any light upon this mystery.

HEATING ENGINEER.

*** We called attention to the extraordinary difference of the highest and lowest tender, as we sometimes do in such cases, by a (!); but we hardly suppose the prices can be for the same system of heating or the same specification. We take it that each firm must have been invited to say for what sum they would efficiently heat the schools. If that is so, however, it cannot be regarded as a satisfactory position, as the Architect to the Board certainly ought to have a definite opinion as to the best system of heating. The matter certainly needs explanation. It looks as if the Board had been trying an experiment to obtain economical heating.

Proposed New Municipal Buildings at Richmond.—It will be remembered that a few weeks since Sir J. W. Ellis presented to the town of Richmond the Castle Hotel, which had for some time been in the market. The presentation was made to the inhabitants with the view of the building being converted into municipal offices, and this is about to be carried out. The Works Committee of the Vestry have had under their consideration plans for the laying out of the site, which, in addition to the hotel itself, includes a considerable area of ground. The plans have now been agreed upon. The building will, to a considerable extent, be reconstructed.

The Student's Column.

ARTIFICIAL STONES.—IV.

Semi-Vitrified Stones (continued).

WHAT were termed "Improvements in Artificial and Malleable Stones" were patented by Giret in 1853. The employment of the term "malleable" in this connexion is an illustration of the loose and inaccurate phraseology which disfigures so many specifications, for the power of being beaten out or rolled into sheets, which is understood by the term "malleability," is most certainly not a property that Giret's stone can lay claim to. The patentee directs that any kind of sand, earth, stone, or metallic ore may be used indifferently after being strongly heated and powdered. This powder is next mixed with fluxes, such as boracic acid, oxide of lead, caustic potash, or soda placed in a furnace and fused, and suddenly, while still hot, precipitated into water. The sand so obtained may be of various colours, if suitable oxides are added previously to fusion. The sandy product, reduced to impalpable powder, is placed in fireclay moulds of necessary shape, and submitted to the action of the oven, until the particles cohere. After cooling slowly, the stone may be polished.

Bellford's patent, which received provisional protection only, varies the above procedure somewhat. The sandy and earthy substances are fused, chilled, and pulverised, and then mixed with unbleached wax to give cohesion to the mass, and to enable it to be carved or moulded into the necessary shape; the articles so formed are heated strongly to get rid of the wax, and then burnt in the usual way. It was also proposed to copy statues or other works of art by taking impressions of them in wax, and from these to make moulds of fireclay, which were then to be filled with the above sandy mixture, and submitted to a melting temperature.

In 1856 an artificial stone was made from iron ore (preferably red ochre or hæmatite, mixed with clay), pulverised, sifted, and incorporated with acidulated water (sulphuric acid is recommended). The plastic material so obtained was pressed into suitable moulds, baked up to the temperature necessary for fireclay, when a product having a bluish colour and glassy surface was obtained.

An ivory-like stone, suitable for small articles and ornamental stonework, was invented by R. H. Hess in 1850. Certain silicates of magnesium, such as talc and steatite, were employed, being powdered and pressed into moulds of any desired form, and then baked. In some cases, alumina, kaolin, lime, carbonate of barium, and colouring matters might be added.

Lefarge's "Artificial Sandstone" (1859, pat. 1,511) is made from a mixture of fine sand and clay, moulded with water, pressed, dried, and burnt in kilns.

B. Barrett's stone, patented in 1860, was a mixture of pulverised stone, pearlash, saltpetre, borax, lime, oxide of lead, clay, and calcined flint, pressed into moulds, dried, and baked.

Pozzi's "Artificial Granite" was made by combining clays in suitable proportions with one or other or any of the following ingredients, viz.:—"Granitic" sand obtained by reducing refuse broken granite by heat, pounded glass, iron slag, lava, and potash. The mixture is moulded and baked at a high temperature.

Some Viennese inventors brought out in 1873 a stone which was obtained by using special cements made from dolomite containing at least twenty-five per cent. of carbonate of magnesium. The material, called "cement of magnesia," was stated to be hydraulic and permanent if it does not for the first two or three days come in continual contact with water.* This cement, it is alleged, will bind satisfactorily twice as much sand as ordinary cement. Artificial stone is formed from a mixture of the cement with sand made into a stiff paste with water, moulded, burnt in kilns, and finally immersed in water for several weeks.

In 1883 a patent "stone," said to be hard and refractory, was made by combining, moistening with water, pressing, and baking at a white heat, mixtures of such minerals as serpentine, soap-stone, felspar, mica, quartz, and fireclay, or some of these variously combined.

* In a future article the liability to ultimate disintegration of cements containing magnesia calcined at a high temperature will be referred to and explained.

A material termed in America "terra-cotta lumber" is obtained by mixing, according to the degree of porosity desired, 1 to 3 parts of resinous wood with 1 part of kaolin and sufficient water to form a spongy mass, which is exposed in metal cylinders to strong compression with steel stamps, the result of this operation being to form cylindrical blocks of from 8 in. to 12 in. diameter, and from 4 ft. to 6 ft. long. The blocks are dried in the air, then in an oven, and finally heated in furnace to a white heat. The blocks when finished are said to be very strong, and can be cut, sawn, and planed, and, moreover, their weight is only about half that of ordinary brick.

Books.

Triangulation and Measurements at the Forth Bridge. By REGINALD E. MIDDLETON, M.Inst. C.E., M.Inst. M.E. London: E. F. & N. Spon. 1887.

THIS is a small book, the substance of which appeared in the pages of our contemporary the *Engineer*, here reprinted with additions, and which sets forth in a brief and business-like manner, and without a single superfluous word, the history of the survey for the Forth Bridge, which was mainly carried on under the immediate direction of the author. The large scale of the work, and at the same time the extreme accuracy required and aimed at in this survey, upon the correctness of which depended the setting-out of steel work to extend over a distance of a third of a mile between points separated by water, renders the record of it of no little value and interest.

The first thing Mr. Middleton had to look to in commencing operations in January, 1883, was the securing of a base line on the Queensferry shore, for which three standard rods 12 ft. long were ordered, and the base line set out with these, on a gradient, however, which necessitated a drop at every three or four rods' length. The author records that the tendency in all cases was for the direct measurements made to be "too long," and he goes on to say that "the tendency may be easily accounted for by the fact that where three rods are placed, any shake must cause them to spread from the centre." This tendency of the rods to settle away from each other would, of course, cause the registered measurement to be short between any two fixed points, but long as determining any two points: the distinction is rather lost sight of in the wording of the sentence.

For the history of the setting-out of the work, and the triangulation adopted, we must refer the reader to the book. We may mention here some experiences, in regard to the behaviour of the various materials, which are of interest. The difficulties with the measuring rods and standards were considerable. "A stone bed was laid down in the cellar of the offices, carefully dressed level, and with brass ends leaded into the stone, the whole being made to fit the 12 ft. rods when at their standard length. This was, however, found to be quite useless, owing, probably, to the stone being in two pieces, and laid on a bed of concrete; the concrete expanded, and the stone settled towards the ends. At any rate, whatever the cause, this gauge in a comparatively short space of time was found to be $\frac{1}{10}$th of an inch too long. A more reliable standard was obtained by measuring a length of 540 ft. along a straight rail on the railway, with three standard rods, and cutting marks in the rock at both sides; then by a string or wire stretched from mark to mark the termini of the standards could always be marked on the rail when wanted, without reference to any movement of the rail itself. In sounding for contours of the rock for the Inchgarvie piers, copper wire was a failure, as it stretched and broke, and eventually the sinker used for these soundings was a bar of iron $\frac{1}{4}$ in. thick and 10 ft. long, with a lead weight cast on it about midway of its length, and the sounding wire was of steel $\frac{1}{30}$ in. in diameter. The soundings were made from a raft moored and fixed in position by two theodolites bearing from different positions on the centre of the raft, which was secured by cables hauled taut when soundings were to be commenced, but which must have had some lateral movement; not such, we suppose, as would materially vitiate a series of measurements chiefly occupied with vertical distances.

The 12 ft. standard rods used in setting-out the greater part of the foundations were of white pine, 12 ft. in length and 3 in. square, the ends of brass, with steel faces cast in. The author recommended wooden rods as not giving way to such sudden changes of length in varying temperatures as would be the case in metal ones; but the setting-out of the steel work on shore was done with steel rods, as these might be expected to follow the temperature of the manufactured steel pretty closely. To assist the attainment of accuracy in this part of the work, a steel standard, about 400 ft. long, made of bridge rails 68 lb. to the yard, riveted together at the joints, and firmly bolted to a mass of concrete at the centre of its length, was laid down in the centre of one of the roads in a wooden box with a movable cover; the 12-ft. standard rods were corrected for length to the temperature of the steel rail on a certain day, and the rail was marked at the end of each rod, and each division so marked was divided up by a pair of compasses. The fact of the work being on such a very large scale, and yet requiring minute accuracy of adjustment, brings out more remarkably than in most engineering works the mobility of all the substances with which we have to deal in construction, and the great difficulty of obtaining in practice the accuracy which seems possible in theory.

Steel bands were used occasionally for checking purposes, but, though useful for this, could not be relied on for primary measurements without great caution, as it was found their changes of length were sudden and great. The same remark applies to steel tapes, and Mr. Middleton remarks on the great inaccuracy of their ends. He suggests that, instead of the ordinary ring or handle, a brass end with a square face accurately cut to length and riveted to the tape or band should be used. In all cases where accuracy was required it was found necessary to hold the tape or band at the one-foot mark, which, of course, gives a large opening for errors, through forgetting to allow for the foot thus lost.

It will be seen that there are some useful practical experiences to be gathered from this account, very interesting in other ways, of the preliminary survey for the greatest engineering work of modern times.

Practical Hints for Draughtsmen. By CHARLES WILLIAM MACCORD, A.M., Sc.D. New York: John Wiley & Sons.

THIS is a book which is well worth perusal. The author certainly advocates many departures from our usual English drawing-office practice, and although there is a great deal to be said for the methods he advises, we cannot bear him out unreservedly. His object in writing this treatise is, however, a good one, and anything which can be done to make drawings clearer in the workshop and to minimise the work in the drawing-office will commend itself to the practical mind. The author's remarks on free-hand sketching are very practical, and will prove very useful to the student. He devotes a small space to "Sketching from Measurement," "Making Freehand Copies from Working Drawings," "Making Sketches from Memory," and "Sketching from the Object without Measuring," concluding with several pages of "Practical Suggestions," containing some very useful examples. The last chapter treats of drawing instruments and materials, giving hints on the selection of both, and a few remarks on their use and care. The first chapters in this book are certainly steps in the right direction, but would be of little use to the architect, as they deal principally with machine and engineering drawings.

The Design and Construction of Masonry Dams. By EDWARD H. WEGMANN, Jun., C.E., M.A. M.C.E. New York: John Wiley & Sons. 1888.

ONE has only to glance at the frontispiece of this important work to realise the state of uncertainty which exists as to the theory of the design of masonry dams. We there see the comparison of six profile types, all proposed by eminent men, yet each differing from the others.

The principles of stability of dams are simple enough in themselves, but to find formulæ which exactly satisfy the conditions of stability at every point of the dam, and thus give us the most economical profile, is, with our present knowledge, beyond our power.

The ordinary method of designing a dam is purely a tentative process, which is usually preferred to solving long equations or to making trials with the subtangent of a logarithmic curve, as proposed by the late Professor Rankine.

The equations given by Mr. Wegmann for designing the profile of a dam are certainly much simpler than any we have yet seen, and much time will no doubt be saved by their use.

Before entering upon the details from which his formulæ are derived, the author shows briefly the different steps taken by De Sazilly, Delocre, and Rankine, and mentions several other engineers by whom the theory of dams has been developed.

The first half of this book is devoted to the theory of design, and the second half to the description and construction of several of the most important masonry dams which have been constructed.

The book is replete with useful information, not only giving us an account of the construction of dams in Spain, France, Algiers, England, and America, but containing excellent diagrams of profile types, and of the various works described.

The scientific design of masonry dams was little thought of until within recent years, but the necessity for high dams has, within the last twenty years, called for a more precise knowledge upon which to rely. We are told by the author that the French were the first to consider the theoretical question, and that the Furens dam, 164 ft. high, based upon a type proposed by M. Delocre, was the first masonry dam scientifically designed.

We can highly recommend Mr. Wegmann's book as a work which will further elucidate a troublesome subject, and give some valuable practical information useful to those engaged in designing dams.

Notes Embodying recent Practice in the Sanitary Drainage of Buildings, with Memoranda on the Cost of Plumbing Work. By W. PAUL GERHARD, consulting engineer for Sanitary Works. New York: D. Van Nostrand, 1887.

THIS is a small book, almost a pocket-book, containing a great deal of practical advice, mostly very good, in a small compass. The recommendations are generally such as are now usually concurred in as sound, both in England and the United States, the two countries in which in recent times the most careful and enlightened attention has been given to sanitary improvements. Occasionally the writer falls below the standard we should set up; for instance, under "Rules regarding the planning and location of plumbing work in dwellings," to say that "in small houses it is preferable to separate the water-closet from the bath-room," is much too moderate a way of putting it; it should rather be said, "No consideration of economy can justify the combination of bath-room and water-closet in one apartment; it is a barbarous, disgusting, and insanitary arrangement, which should in no case be allowed." That would be our way of putting it. At the same time, the special consideration of the planning and placing of plumbers' work is a very good point in the little treatise, and one often overlooked. We do not quite comprehend the remark "overflow-pipes and waste-pipes not in daily use are objectionable." As to waste-pipes this is perfectly true and reasonable, but how can an overflow-pipe to a bath, for instance, be in "daily use," unless it is placed so low as to practically prevent the bath being ever filled? It is very desirable to flush such an overflow from time to time, no doubt, but it is impossible, in the nature of things, that it can be "in daily use" unless it is a custom to fill a bath to overflowing every day.

A special point in the book is the attention drawn to the importance of leaving drains and traps in such a condition that they may, as far as possible, be found efficient on return, in cases where the house has been left empty for some time during a migration to winter or summer quarters. This is a matter generally quite overlooked. Water evaporates out of traps, and the inhabitants return to a house permeated by sewer air. The author's suggestions on this head (pages 106-8) are worth attention.

Church Clock, Hindley, near Wigan.—On Sunday morning, July 22nd, a large chiming clock was started in St. Peter's Church, Hindley, by the Rev. Peter Jones, the vicar. The clock has four dials, each 6 ft. across. The quarters are chimed upon four bells, and the hours are struck upon the largest bell in the tower. The clock is by Messrs. John Smith & Sons, Derby.

RECENT PATENTS.

ABSTRACTS OF SPECIFICATIONS.

11,045, Sash Fastenings, &c. W. E. Harris and H. J. Luckock.

Simplicity in construction and security are the points aimed at by this inventor. The fastener consists of two parts,—(1) A plate screwed to the rail of the upper sash, having a back or turnover piece, and between the plate and this turnover piece, a radial arm working on a centre nearly resembling those now in common use; (2) A second plate, secured to the rail of the lower or inside sash, carrying the circle plate. The shape of the radial arm allows it to act with a spring fitted thereto, and two indentations fitting into projections lock the arm when it is in the position for fastening the window.

11,509, Bricks and Blocks for Building. W. Warrington and W. W. Howlett.

According to this invention, bricks and other blocks are made with the edges bevelled, so as to form a waterproof joint, thus rendering the wall or other building proof against damp or rain, and giving a joint with or without mortar on the surface of the building.

2,366, Manufacture of Cement. Geo. J. Snelus and Others.

In the process of these inventors, blast-furnace slag is employed, together with lime, forming, when burned, a frit or clinker. This clinker is pulverised and reduced to the required degree of fineness for cement.

4,176, Moulding and Casting Pipes. J. Kudlicz and J. Ahlemeyer (Bilbao).

In moulding and casting by the ordinary methods, the exterior mould has to be constantly completely renewed. The purpose of this process is to so construct the main part of the exterior mould that it can be employed repeatedly, and, so to speak, continually, offering a great economy of labour, moulding, and material. The mould is built up in fireproof material (with an opening for pouring in the molten metal) in a mass, which, owing to its constitution, and a thorough stamping and hard drying, is fireproof for the first casting, and is porous, and remains so for further castings.

6,588, Fire Grates. T. A. Bennett.

This invention consists in an improved arrangement of combined blower and canopy, with means for adjusting and supporting the same at various heights above the grate bars. The metal plate, which forms the blower or canopy, is fitted in recesses or slideways formed in or attached to the cheeks on either side. It can be pulled up or down, or fixed in any position. When pulled down to its lowest point, the plate forms a blower for drawing the fire, and, when pushed up, the lower part forms a hood or canopy for the fireplace.

7,096, Cupboard Drawers or Window Catche and Locks. W. P. Thompson.

This patent relates to fasteners which are worked by simply pushing or pulling a rod, and without the use of keys. The movement of the shaft is communicated to the bolt or locking-bar by an inclined surface or wedge, the direction of the motion of the shaft being at an angle (preferably a right angle) with the bolt. By this device the bolt can be made perpendicular with the surface of the post or frame on which the lock is applied. Thus the door or window can be opened by a backward or forward movement of the shaft or spindle.

7,020, Oil Cement. W. Alber.

The idea of this invention is the production of a strong and quick-setting cement, which may, after setting, be dissolved by suitable means, so that objects which have been united by the cement may thereafter be separated, if desired, without damage. This is effected by the addition of manganese borate to a cement of lead oxide and linseed oil, and treating it with turpentine before applying it. It may be used very thin and sparingly, and when set firmly may be dissolved by the application of spirit or suitable solvents.

NEW APPLICATIONS FOR PATENTS.

July 13.—10,174, G. & C. Rollason, Bath and Lavatory-Basin Fittings.—10,180, J. Da Fonseca, Water closets, &c.—10,219, R. Gamble, Combined Door Spring and Alarum.

July 14.—10,247, G. Haywood, Kitchen Ranges.—10,258, H. Maul, Safety Door-chain Appliances.

July 16.—10,288, Z. and J. Pack, Brick Moulding Machines.—10,292, W. Langford, Ornamenting and Preserving Wood, Bricks, Tiles, &c.—10,298, J. Way, Curing Smoky Chimneys and Preventing Down-draught.

July 17.—10,343, J. Crossthwaite, Chimney-pieces, Mantel-pieces, &c.—10,358, W. Lake, Heating Houses, Factories, &c.—10,365, E. Oates, Paint-Removing Compound.

July 19.—10,456, J. Steevenson and S. Eddington, Mould for Making and Pressing Bricks.—10,459, W. Harte, Combined Window Fastener and for Locking Windows when Opened.—10,473, J. Schlesinger, Cement.—10,477, W. Brothers, Glass Hit-and-miss Ventilators.

PROVISIONAL SPECIFICATIONS ACCEPTED.

5,169, W. Bracewell and W. Hayhurst, Flooring Cramp.—8,266, F. Burton and J. Robertson, Window Sash Fastener.—8,599, W. Palmer, T-square.—8,831, E. Chatham, Crushing and Mixing Mortar.—8,901, H. Wallis, Speaking-tubes.—9,074, G. Newman, Door Springs and Checks.—9,138, Gibbons, Fanlight Openers.—9,162, J. Holden, Securing and Bracing Cross Beams and Principal Rafters of Buildings.—9,176, C. Duplany, Fireproof Curtains for Theatres.—9,217, E. Eite and H. Gooch, Fastener for Doors, Door and Window Sashes.—9,273, C. Bennet, Laying and Fastening Wooden Flooring.—9,317, R. Stephens, Fastenings for Casements, &c.—9,466, T. Tucker, Automatic Sash or Window Fastener.—9,629, L. Baxter, Hinges.—9,767, G. McNeil, Fastener and Lock for Windows, Sashes, Doors, &c.—9,962, W. Cooper, Water-closet Structures.

COMPLETE SPECIFICATIONS ACCEPTED.

Open to Opposition for Two Months.

12,279, E. Williams and J. Morgan, Domestic Firegrates.—12,603, W. Baird, Fastenings for Doors of Theatres, Halls, &c.—12,717, C. Peak, Metal Door and Window Plates.—13,322, E. Solvay, Lime Kilns.—15,406, A. Orr, White Lead.—7,229, V. Schubert, Stone-breaking Machine.—7,957, J. Tonge, Preventing Down-draughts in Chimneys and Flues.—8,323, H. Wells, Screw Nails.—8,813, H. Lake, Metallic Roofing Plates or Shingles.

RECENT SALES OF PROPERTY.

ESTATE EXCHANGE REPORT.

JUNE 27.

By FAREBROTHER, ELLIS, & Co.
(At Newark.)

Newark—Twenty-two plots of freehold land..... £9,830
Market-square—The Clinton Arms Hotel, freehold 5,500
Lombard-street—The Saracen's Head Hotel, freehold 3,500
Castle Gate—The Ram Hotel, freehold 2,300
Stodman-street—The Royal Oak Inn, freehold ... 2,450
" " The Woolpack Inn, freehold..... 1,750
Boar-lane—The Angel Inn, freehold 1,760
Market-place—The Queen's Head Inn, freehold... 1,600
Portland-street—The Horse and Gear Inn, freehold 1,030
Balderton-gate—The Admiral Lord Nelson, freehold 1,000
Castle-gate—The Royal Oak Inn, subject to a life aged 75 years 120
36 and 37, Market-place, and premises in Lombard-street 2,400
Saracen's Head-yard—A block of freehold property 450
10, Boar-lane, freehold 650
Castle-gate—The Oddfellows' Arms Beerhouse, freehold 610

JULY 5.

By FAREBROTHER, ELLIS, & Co. (At Lewes).

Seaford—Seven plots of land, 10a. 2r. 39p. 3,230
17, Pelham-place, freehold..... 660
1 and 2, Marine-villas, freehold 960

JULY 12.

By MESSRS. COBB (at Dover).

Dover—Enclosure of land, 22a. 1r. 3p., freehold..... 3,000

JULY 16.

By C. RAWLEY CROSS.

Shepherd's Bush-road—Nos. 28 to 36, freehold 2,800

By E. & F. SWAIN.

Notting Hill—26 and 28, Kensington Park Gardens, freehold 4,235

By — HORNE.

Isleworth—Smallberry Green—Market Garden land, 2a. 2r. 13p., copyhold 1,700
A plot of copyhold fruit land..... 130

By WATERER & SONS.

Chobham, Surrey—Two plots of freehold garden land 115

JULY 17.

By THURGOOD & MARTIN.

Whitechapel—74 to 79, Chamber-street, freehold ... 2,060
Barnsbury—56, Thornhill-square, 57 years, ground-rent £1..... 630
Greenwich—5, George-place, freehold 220
12 and 13, Cottage-place, freehold 570

By DEBENHAM, TEWSON, & Co.

Matfield Green, Kent—Two freehold cottages..... 470

By DRIVER & Co.

Wokingham, Berks—Freehold land, 17a. 1r. 30p..... 2,600
Guildford, near—The Manors of Bramley and East and West Bramley, with their Rights, &c..... 3,100

JULY 18.

By R. TIDEY & SON.

Camberwell—8 and 14, Benhill-road, 81 years, ground-rent £11 500
Stoke Newington—17, Gordon-road, 71 years, ground-rent £5 16s. 300

By Mr. NETTLEFOLD.

Bromley—Stobery Cottage, subject to lives aged 69 and 53 years 850
Stobery House, subject to same lives 825
10 and 11, Church-road, subject to same lives 310
Four cottages, subject to same lives 335

By CHARLES & TUBBS.

Willesden—Ground-rents of £20, reversion in 96 years..... 460

JULY 18.

By FAREBROTHER, ELLIS, & Co.

Sandwich, near—Whitehall Farm, 41a. 1r. 29p., freehold 3,600
Poyson's Farm, 32a. 1r. 4p., freehold..... 2,420
Jackey Baker's Farm, 51a. 0r. 16p., freehold 3,860
Lydden and Newport's Farm, 118a. 3r. 23p., freehold 6,960
Freehold marsh lands, 38a. 3r. 18p. £1,160
Numerous inclosures of freehold land, 116a. 0r. 12p. 10,000

JULY 19.

By E. & S. SMITH.

Clerkenwell—28, Amwell-street, 18 years, ground-rent £8 8s. 430

By T. B. WESTACOTT.

Camden-town—12 to 20 even, Charlton King's-road, 52 years, ground-rent £27. 10s..... 950

By S. BETTS.

Hoxton—33, Allerton-street, 20 years, no ground-rent 200
34, 35, and 37, Allerton-street, 20 years, ground-rent £10 10s. 345

By C. C. & T. MOORE.

West Ham—2 and 6, Hartland-road, 92 years, ground-rent £10 280
Poplar—1, 3, and 5, Alton-street, 54 years, ground-rent £12..... 380

By INMAN, SHARP, & HARRINGTON.

Stratford, 9, South-street, freehold..... 95

By VAUGHAN & Co.

Euston-road—Ground-rents of £59 18s., reversion in 19 years 2,600

By D. YOUNG.

Clapham-road—No. 99, term 11 years, ground-rent £6. 10s. 275

By HAMNETT & Co.

Hitchin, near—The residence, Holwell Bury, and 277a. 0r. 3p., freehold 13,000

By NEWBON & HARDING.

Clerkenwell—2 and 3, Chadwell-street, 23 years, ground-rent £10..... 580
Improved ground-rents of £27. 19s., term 23 years 365
Holloway—38 and 40, Eden-grove, 69 years, ground-rent £10. 1,010
42, Eden-grove, 57 years, ground-rent nil 310
44, 46, and 48, Eden-grove, 59 years, ground-rent £21 870
23, Durnford-road, 74 years, ground-rent £2. 10s. 590
47, Lowman-road, 74 years, ground-rent £2. 10s.... 505
24 and 26, Tollington-road, 46 years, ground-rent £12. 12s. 690
Finsbury Park—108, Plimsoll-road, 88 years, ground-rent £6 250

By WALTON & LEE.

Guildford, near—Part of Manor Farm, 107a. 2r. 10p., freehold..... 1,730
Part of the Home and Manor Farms, and Northcote Wood, 142a. 2r. 13p., freehold..... 2,750
Hammond's Farm, 151a. 1r. 27p., freehold 3,100
East Clandon—The Queen's Head and the Barley Mow Inn at West Horsley, freehold 3,250
Numerous inclosures of land, with houses, cottages, &c., 83a. 1r. 34p. 5,695

JULY 20.

By G. A. WILKINSON.

Beddington-lane—Freehold detached house and grounds 1,010
A ground-rent of £14. 5s., reversion in 77 years... 320
Streatham Commom, Crown-lane—A profit rental of £13. 10s., term 22 years 145
A ground-rent of £35, reversion in 22 years 1,970
Two semi-detached houses, freehold 2,250

By VENTOM, BULL, & COOPER.

Wandsworth—10, 12, and 14, Wickersley-road, 77 years, ground-rent £13. 10s. 450
Camberwell—Castle-street, ground-rents of £60, reversion in 75 years 1,340

By CHESTERTON & SONS.

Hyde Park—34, Leinster Gardens, 62 years, ground-rent £30 2,700
1a and 8a, Porchester Mews, 50 years, ground-rent £13 920

By COLLIER & BOWDICH.

City—78, Leadenhall-street, freehold..... 2,100

By J. POUSTY.

Bedfont, Staine's-road—Freehold house 500
Wandsworth—107, Harbut-road, 90 years, ground-rent £6 10s..... 250

By H. A. HENDERSON.

Clapton—13, 19, and 21, Cricket Field-road, 78 years, ground-rent £18. 18s. 73

By WALLEN & CLUNN.

St. Georges-in-East—24, 26, and 28, Devonshire-street, 12 years, ground-rent £7 10s. 72
10 to 13, Albion-place; and 1, 2, and 3, Mary-place, 12 years, ground-rent £15..... 75
19, Wallburgh-street, 3¾ years, ground-rent £1. 6s. 13
4 and 6, Ann-street, 12 years, ground-rent £3. 3s. 82
61 and 63, Tait-street, 12 years, ground-rent £4. 4s. 48
Stepney—22 to 28 even, Woolsey-street, 12 years, ground-rent £8. 5s. 280
Stoke Newington—63, Shakespeare-road, 64 years, ground-rent £4. 10s..... 205

By F. J. BISLEY.

Rotherhithe—3, Rebecca-terrace, 62 years, ground-rent £4..... 325
81, Clarence-street, freehold 245
Bermondsey—39, Drummond-road, and ground-rents of £6, 46 years, ground-rent £9 270

By BAKER & SONS.

Child's Hill—1 and 2, Norfolk-place, freehold..... 1,410
Golder's Green—Six freehold cottages, and 1a. 0r. 8p. 1,100
The Decoy Farm, about 6 acres, freehold 1,200
An enclosure of freehold land, 2a. 3r. 30p..... 700

By DOWSETT & Co.

Harrow, Elm-terrace—Ground-rent of £17, reversion in 94 years 360
Murray-terrace—Ground-rents of £17. 17s., reversion in 94 years 390

No. 31, Egerton-gardens.—We are asked to mention that the staircase in our illustration of the interior of this house in the *Builder* of the 14th inst. was executed by Mr. W. J. Barnikel.

MEETINGS.

SATURDAY, JULY 28.

Architectural Association.—Visit to Professor Herkomer's House and Schools at Bushey. Members to meet in Hall of Euston Station at 2·25 p.m.

TUESDAY, JULY 31.

Institution of Mechanical Engineers.—Summer Meeting, to be held in Dublin, under the presidency of Mr. E. H. Carbutt.

WEDNESDAY, AUGUST 1.

Institution of Mechanical Engineers.—Meeting in Dublin continued.

Builders' Foremen and Clerks of Works' Institution.—8·30 p.m.

THURSDAY, AUGUST 2.

Institution of Mechanical Engineers.—Dublin Meeting continued.

FRIDAY, AUGUST 3.

Institution of Mechanical Engineers.—Visit to Belfast.

Miscellanea.

Mixing Sugar with Cement Mortar—Experiments on the reported increase in the binding effect of cement mortar by the addition of sugar have been made by Captain A v. Grünzweig, of Vienna, which have just been published. Mixtures of cement and sand, consisting of one part cement and three parts sand, to which 10 per cent. of water was added, and of pure cement with as much water as was necessary to give the mass the required plasticity, were prepared. From 1 to 5 per cent. of powdered sugar was well mixed with the dry cement. The cement used was of inferior quality, the sand being ordinary building sand, and not the so-called "normal" sand, which is of a superior quality. For this reason, and also because the samples,—prepared in accordance with the rules for testing Portland cement laid down by the Austrian Society of Engineers and Architects,—were left to harden in a dry place, and not under water, the strength obtained was far below that prescribed and generally obtained. All the samples were prepared by the same person, under the same conditions, and with the same care. For each series of samples of mortar to which sugar was added, a comparative series without sugar was made. The tenacity was ascertained by Kraft's cement-testing machine. It deserves mention that the samples with sugar,—especially those of pure cement,—showed a strong tendency during the first twenty-four hours to combine intimately with the smooth china plate on which they were placed, and to swell. The experimenter gives full particulars of the trials. As the result of his trials, it may be briefly stated that with mixtures of cement and sand, by hardening in a dry place, the binding effect may be raised by the addition of sugar, which reached its maximum with from 3 to 4 per cent. of sugar added. With pure cement, the binding effect was not increased.

Railway Construction in the United States.—From a return just to hand, it appears that the year 1888 will not be far behind 1887 with regard to the construction of new railways in the United States. Up to the end of June, 3,320 miles of new track had been laid down, against 3,754 miles built in the first six months of 1887. The total last year reached nearly 13,000 miles, and as in the United States the greatest activity prevails in the latter half of each year, we may perhaps take it for granted that the present year will exceed any previous year, excepting, of course, 1887. The figures given so far bring out a remarkable fact,—namely, that, while the 3,754 miles reported for the first six months of 1887 were laid down by 136 companies, the 3,320 miles built thus far this year represent 168 lines. That is to say, the mileage built in the first six months of 1888 averages less than 20 miles to each line. This seems to indicate that the new mileage will be made up by the construction of a large number of comparatively short roads, instead of comprising, to a great extent, long lines built by a few companies.

Building at Tangier.—There has been an increased trade in building materials generally, especially in cement, deals, and iron rafters, owing to the large number of houses being built at Tangier. The cement is chiefly English, whilst the deals and iron rafters, though shipped in England, are respectively of Belgian and Swedish origin.

New Town Hall in Copenhagen.—The Corporation of Copenhagen has decided upon erecting a new town hall in that city, the cost of which is estimated at 25,000*l.*

The Engineering Trades and Bridge Building.—Mechanical engineers are, as a rule, busier than last year, and, judging by the proportion of inquiries that result in actual business, the prospects for the autumn are good. The increase in the general exports of the country is favourable to engineers, as activity in the textile as well as in the iron and other trades tells speedily on all who provide the machinery of manufacture. Plant and tools for iron and steel works, mining and pumping engines, arsenal plant, railway appliances, and workshop equipment for home and Indian lines, are what at present afford most employment. Petroleum engines, in which vaporised oil serves the same purpose as gas in a gas engine, are apparently a success. There is the same cycle of explosions, and the advantage is only where cheap gas is unprocurable. Bridges and structural steel-work are now purchasable at prices unprecedentedly low, and it can only be hoped that the encouragement thus afforded to public works by the cheap construction of railway bridges and large roofs may compensate makers by an increased demand for the low prices they have been obliged to accept. The solidity and permanent durability of riveted work which the modern system of hydraulic machinery allows is encouraging the choice of such connexions in preference to pin joints; and even in the United States, where the latter method has prevailed, it is becoming recognised that the cheapness and expedition in erection which pin joints allow are not the determining feature in bridges for heavy railway traffic. In America, pneumatic riveting machines in which a low air-pressure is concentrated by larger cylinders and longer levers than in English hydraulic machines are almost universal for portable machines. Hydraulic pressing and forging machines are common to both countries, but except in steel works the accumulator system is not so widely applied in America as in England. Bridges have been in considerable demand for India, South America, and the Colonies, but there are no new structures of importance ordered so far this year. The railway companies in England are steadily strengthening and renewing their older bridges to meet the exigencies of modern traffic; while in Canada and the United States the replacement of old wooden structures by steel or iron will give employment to bridge builders in these countries, even though the demand for new lines should not meet present expectations.—(From Matheson and Grant's "Engineering Trades' Report," July 16.)

The Water Supply of Hamburg.—The Corporation of Hamburg has voted a sum of 337,000*l.* for the filtration of the water supplied by the Hamburg Stadtwasserkunst. The water is taken directly from the Elbe, and is reported by Hamburg journals to be very bad. Since their establishment the Hamburg Waterworks have cost 650,000*l.*, exclusive of the above sum. It would seem that the water supply at present is very dear, the cost being 4 sh. per individual head of the population. The *Börsenhalle* says that great satisfaction must be expressed at the step taken, as some physicians are of opinion that the bad drinking-water was the cause of cases of typhus last winter.

New Official Buildings in Stockholm.—It is proposed by the architect of the Swedish Government, Herr Zetterwall, to erect the new Houses of Parliament, for which money was recently granted, on the so-called Helgelandsholme, an island in the Stockholm river, facing the Royal Palace. Here the new Treasury buildings are also to be built, the cost of the whole being estimated at about 500,000*l.* This would effect a great improvement in the Swedish capital, the island in question, now occupied by the Royal stables and stables, being an eyesore. A new theatre is also to be built in Stockholm, at a cost of 45,000*l.*

Exhibition in Helsingfors.—During the present summer an exhibition of forestry, manufactured wood goods, and metallurgy will be held in Helsingfors, in Finland.

Wesleyan Chapel, Penryn.—The design prepared by Mr. J. Wm. Trounson, architect, Penzance, for the new Wesleyan chapel at Penryn, Cornwall, has been selected.

Festive.—The *employés* of Messrs. Dent & Hellyer held their twenty-seventh annual dinner at Broxbourne, on the 21st inst., Mr. S. Stevens Hellyer in the chair.

Preparing and Cleavage of Slate.—The managers of the Tiberthwaite Green Slate Co. have issued a rather pretty little pamphlet on their industry (which has been carried on in the same quarries for about two centuries), with photographic illustrations showing portions of the quarries and different departments of the yard works. We extract the following note on the preparing of slate:—"The blocks of slate rock have to be detached from the sides and floor of the quarry in the first place by blasting with gunpowder; men being let down the face of the cliff-like sides by ropes, to bore the necessary holes for the insertion of the charge. After the rock is detached, it passes to the hands of men called 'dockers up,' who reduce it to suitable sizes, by aid of heavy hammers and chisels, for hoisting to the surface, where it goes to the splitting' or 'riving' sheds, to be split up into 'flakes' or 'layers,' so to speak; after which it passes to the 'dressers,' who cut it to the necessary shapes and sizes. The question of the splitting of slates or 'cleavage,' as it is properly called, is a very interesting one; and such eminent authorities as Professor Sedgwick, Professor Tyndall, Professor Phillips, Professor Ramsay, Sir H. De la Beche, and Mr. Sorby differ as to the probable agency to which this result is due, some advocating magnetic current and others mechanical and chemical action. There are two modes of "splitting" in common use amongst the quarrymen: one (the Welsh) carried out by hammer and chisel, the other (the Westmoreland) being brought about by the use of a light thin edged hammer alone, by which the splitter divides the slate by very skilfully applied blows at the side of the slate along the line of cleavage."

New Foot-bridge over the Ouse at Bedford.—A new foot-bridge, erected for convenient access to the new public recreation grounds acquired by the Bedford Corporation on the south side of the River Ouse, was opened on the 11th inst. by the Marquis of Tavistock. The bridge consists of two light-braced segmental ribs, 100 ft. clear span, and 7 ft. apart, from which is suspended the footway, by rods $\frac{3}{4}$ in. in diameter. The footway is of cement concrete, laid on corrugated flooring plates, 3 in. deep, 12 in. pitch, and $\frac{1}{4}$ in. thick. The soffit of the main ribs is 25 ft. above the water-line at the centre of the river, and that of the curved footway 15 ft., both springing from the river bank, so as not to impede the view along the ornamental gardens on the river side. The main ribs each consist of four angle irons 4 in. by 3 in. by $\frac{7}{16}$ in., braced together with angle irons and flat bars 3 in. by $\frac{5}{16}$ in. and 2$\frac{1}{2}$ in by $\frac{5}{16}$ in. A wrought-iron handrailing is attached to the suspension-rods on each side. The total weight of ironwork, including flooring-plates, bolts, &c., was under 18$\frac{1}{2}$ tons. The engineer for the work is Mr. John J. Webster, M. Inst. C.E., of Liverpool, who also designed the large iron roadway bridge for the Bedford Corporation, which was opened three years ago. The contractors for the ironwork are Messrs. E. Page & Co., Bedford.

Portsmouth Waterworks.—Messrs. Morgan, Isted, & Morgan, of Southampton, have just commenced the erection of large engine and boiler-houses, chimney-shaft, &c., at Bedhampton, near Portsmouth, for the Borough of Portsmouth Waterworks Company, the contract for the buildings, &c., having been entrusted to them. This pumping-station is entirely a new one, to meet the demands of a rapidly-increasing population at present supplied by this Company. Messrs. Joseph Quick & Son, of Westminster, are the engineers for these works, the total cost of which is estimated at some 17,000*l.*

Hygienic Researches in Swedish Schools.—The Association of Teachers of Sweden is, with the assistance of medical and sanitary experts, on the point of investigating the hygienic conditions of the National and Board schools of Sweden, with a view to their improvement. To that effect some 3,000 circulars have been issued, calling upon schoolmasters to answer forty tabulated questions respecting the sanitary conditions of their schools, and the material thus collected will be submitted to the experts referred to to report thereon.

Exhibition at Athens.—Early in October an exhibition of Greek and foreign arts and manufactures is to be opened in Athens, lasting for six months.

The Association of Public Sanitary Inspectors of Great Britain.—At a special meeting of the Association of Public Sanitary Inspectors, called for the revision of rules, held at Connaught Mansions, Victoria-street, S.W., on Saturday, the 21st inst., Mr. Hugh Alexander, Chairman of Conncil, presiding, it was unanimously resolved to add to the title of the Association the words "of Great Britain," the enlargement of title having become necessary owing to the wide extension of the movement, inaugurated by the Association in 1883, to secure, by the union of all public sanitary inspectors, the interests of public officers, and also the higher interests of the public health. The President, Mr. Edwin Chadwick, C.B., who was unable to be present, addressed a communication to the Chairman, cordially approving the proposed enlargement of title. The full title of the Association will be in the future "The Association of Public Sanitary Inspectors of Great Britain." Fifteen members and associates were elected, and it was announced that the Association had received and accepted an invitation from the Mayor to hold a meeting at Brighton in August.

Excavations at Bothwell Castle.—The *Glasgow Herald* says that "at the instance of the proprietor, the Earl of Home, some interesting excavations have been going on at Bothwell Castle, with the effect of laying bare the ancient foundations of the portion which for many centuries has been razed to the ground. The spot operated on is the grass-grown mound to the rear of the ruins—a wide area covered with large spreading oaks, beeches, and other trees. A wall, the continuation of the north side of the castle, has been traced, with a flanking round tower at the end of it; as also another wall running transversely to a similar tower of larger size than the first one. They are the counterparts of the flanking towers overhanging the river. The operations, which are not yet completed, have been carried out under the superintendence of Mr. Archibald, head gardener. In the *débris* there have been found a winding horn made of clay and enamelled, and a horse-shoe. A squad of men are engaged cementing the upper portion of the ruins, and otherwise preserving them from the ravages of time."

Birmingham Archæologists at Knowle.—On Saturday the Archæological Section of the Birmingham and Midland Institute made an excursion to Knowle. On arriving at Knowle station the party drove to Knowle village and examined the church, which was built in the fifteenth century by Walter Cooke, who also founded a guild and college of priests. Mr. J. A. Cossins pointed out the successive architectural changes and enlargements made by the founder, these being clearly shown in the fabric. The church contains one of the finest carved oak rood-screens to be found in the Midland Counties. The party then walked by a very pleasant route to Temple Balsall, where the old parish church—on the site of a preceptory of the Knights Templars, and afterwards of the Knights Hospitallers—was visited. This church was restored by Scott in 1849. The almshouses founded by Lady Catherine Leveson in 1677 were afterwards visited.

The Frederick Edwards Testimonial Fund.—We are asked to again call attention to this fund. We referred to the proposals of the Committee in our last volume (p. 250), but may here briefly remind our readers that the fund is not only being collected in acknowledgment of Mr. Edwards's public services over a long series of years in all matters connected with the domestic use of fuel and the prevention of smoke, but in order to provide what is absolutely necessary, viz., a moderate provision for Mr. and Mrs. Edwards for the remainder of their lives. Mr. Edwards's address is Boston Cottage, Shanklin, I.W.

Sale of Building Land at New Barnet.—The sale of second portion of the freehold building-site, consisting of shop-plots, situate at the junction of Station and East Barnet roads, was conducted by Mr. E. Fergusson Taylor at the "Railway Hotel," New Barnet, on Monday last. There were nine lots, three of which (having areas of from 120 to 157 square yards) sold for 150*l.* each. A fourth lot, having an area of 135 square yards, fetched 300*l.* Five of the lots were not sold.

Prizes for Plumbers. — The Plumbers' Company have made a grant of five guineas to be awarded as prizes to the students attending the plumbing classes at the Polytechnic Y.M.C.I., London, for the session 1888-9.

Value of Property in Cheapside and Bayswater.—In a compensation case heard at Guildhall on Saturday last, the freeholders of a corner site, 115 and 116, Cheapside, were the claimants against the Commissioners of Sewers, who required the property for the widening of Milk-street. For the claimants, Mr. G. P. Bidder, Q.C., and Mr. H. A. De Colyar appeared, instructed by Mr. C. G. Woodroffe. For the Commissioners, Sir Edward Clarke, Q.C., M.P., and Mr. Rose Innes appeared, instructed by Mr. A. E. Bayles. The surveyors retained on behalf of the claimants were Mr. E. Farmer, Mr. S. Walker, Mr. Lang, and Mr. W. H. Woodroffe. For the Commissioners, the witnesses retained were Mr. Robert Vigers, Mr. W. J. Beadel, M.P., and Mr. Legge. After some discussion between the counsel on both sides it was agreed that the sum of 22,500*l.* and taxed costs should he awarded to the claimants. The area of the site is 1,300 ft., and the premises were subject to a lease at 800*l.* per annum for an unexpired term of 16½ years. The claim was based on an estimated ground rental value of 20s. per foot, super-deferred for 16½ years, on which basis the verdict was practically given.—The *Times* reports that at the Auction Mart on Wednesday, Messrs. Edwin Fox & Bousfield sold the whole of Orme-square, facing Hyde-park, for 38,000*l.* It comprises 12 houses let on leases, the longest of which expires in 1899, at rents amounting to 1,240*l.* per annum.

Awards at the Bolton Sanitary Exhibition.—In the list of awards at the Bolton Exhibition, published in the *Builder* of last week [p. 48], Mr. W. Fox's corrugated rolled steel tyre for vehicles for common roads was not mentioned as having received a medal after deferred practical trial. We omitted to mention it as it seemed to be a little wide of the exhibits in which our readers are specially interested, but, from particulars which have since been brought to our notice concerning it, it seems to be well worth mentioning as affording a greatly-increased degree of safety when driving over town roads along which tramways are laid. The corrugations, it should be explained, are not on the *surface* of the tyre, but on the *edges*, so that the bounding or side lines of the tyre are zigzag. The tyre thus overlaps the inner and outer sides of the felloe of the wheel at short intervals, and prevents the wheel from becoming locked or jammed in a tram-rail groove. The new safety tyre is not quite so neat and sightly as the old-fashioned one, but it seems likely to conduce to the longevity of axles and springs, and to diminish the risks to life and limb hitherto incurred when driving over tramway lines.

Society of Art-Masters.—A meeting of Masters of Schools of Art was held on Wednesday and (by adjournment) on Thursday in the Lecture Theatre of the South Kensington Museum, to form an association representative of their interests and of the interests of art education. About sixty gentlemen attended from all parts of the kingdom, and a society was established to be called the Society of Art-Masters. Mr. Edw. R. Tayler, of Birmingham, was appointed chairman for the ensuing year; Mr. Alex. Fisher, of Brighton, vice-chairman; and Mr. Francis Ford, secretary. Membership is limited to holders of an Art-Master's certificate (third grade) from the Department of Science and Art.

Sale of a Building Estate at Broadstairs.—An extensive property at Broadstairs, known as the Stone Park Estate, is about to be laid out for building upon. The property covers an area of 123 acres, and Messrs. Moss & Jameson, of Chancery-lane, have just disposed of it in several lots. One of the lots, containing 32 acres, was sold for 4,000*l.*; and another lot, containing 50 acres, realised 5,000*l.* The total sum realised by the sale of the estate is 12,775*l.*

The Association of Municipal and Sanitary Engineers and Surveyors.—Besides the report of the visit of this Association to the Barking Sewage Works, which will be found in another column, reports of several other visits to works, &c., are in type, but are crowded out this week. We print two of the papers read during the annual meeting, viz., that by Mr. McKie, City Surveyor of Carlisle, and that by Mr. De Courcy Meade, of Hornsey.

Rebuilding of Sevastopol.—The progress of the rebuilding of this town is rapid, and skilled workmen will find a demand for their labour at Sevastopol, Sympheropol, and Yalta. At the last-named town builders, cabinet-makers, and carpenters can, in proportion to their skill, find a most remunerative market.

The English Iron Trade.—The improvement in the English iron market, of which we had the first indications several weeks ago, is being steadily maintained, and this week it has all the appearance of a permanency about it which has hitherto been absent. The condition of the pig-iron trade, if it is not all that can be desired on account of the lowness of prices, must certainly be pronounced healthy. There is a well-sustained demand; shipments are keeping up well, leading to a gradual diminution of stocks. Middlesbrough pig has gone up another 6d. a ton, and is now very stiff at 32s. 6d., makers being unwilling sellers at that price. Both Scotch warrants and Scotch makers' irons have been improving during the week. The tone of the Lancashire crude iron market is stronger than it has been for some time past. Bessemer iron keeps very steady. If the change in manufactured iron has not been very great, it is, at any rate, moving in the right direction, manufactured iron, with a fairly good demand, getting much stiffer. The best trade is being done in sheets and ship plates and angles. Steel for the same purpose is also very strong; the call for railway material is satisfactory, but for other descriptions of steel the tone is rather weaker. Tinplate makers report a much greater eagerness of buyers, which has helped to strengthen prices. New orders for ships are not very plentiful just now, but yards will present a busy aspect for some time to come. Engineers' reports are encouraging, more remunerative prices being obtained by them.—*Iron.*

PRICES CURRENT OF MATERIALS.

TIMBER.	£.	s.	d.	£.	s.	d.
Greenheart, B.G. ....ton	6	10	0	7	10	0
Teak, E.I.....load	8	0	0	12	10	0
Sequoia, U.S.....foot cube	0	2	3	0	3	0
Birch, Canada .....load	2	15	0	4	15	0
Fir, Dantsic, &c.	2	0	0	4	0	0
Oak ,, ...	2	0	0	4	10	0
Canada	4	0	0	6	10	0
Pine, Canada red	2	10	0	3	10	0
,, yellow	2	10	0	4	0	0
Lath, Dantsic.....fathom	3	10	0	5	0	0
St. Petersburg.....	5	0	0	6	0	0
Wainscot, Odessa, crown.....	2	10	0	3	0	0
Deals, Finland, 2nd and 1st...std.100	8	0	0	9	10	0
,, 4th and 3rd.....	6	10	0	7	10	0
Riga	6	0	0	7	10	0
St. Petersburg, 1st yellow	9	10	0	14	10	0
,, 2nd ,, ...	8	0	0	9	0	0
,, white	7	0	0	10	0	0
Swedish.....	7	0	0	15	10	0
White Sea	8	0	0	17	0	0
Canada, Pine, 1st	14	0	0	23	0	0
,, ,, 2nd	9	0	0	15	0	0
,, ,, 3rd, &c.	7	0	0	9	10	0
,, Spruce, 1st	8	0	0	9	10	0
,, 3rd and 2nd	6	0	0	7	10	0
New Brunswick, &c.	6	0	0	7	5	0
Battens, all kinds	4	10	0	11	0	0
Flooring Boards, sq., 1 in., prepared, First	0	10	0	0	13	0
Second	0	7	0	0	9	6
Other qualities	0	4	6	0	6	6
Cedar, Cuba.....foot	0	0	3½	0	0	4
Honduras, &c.....	0	0	3½	0	0	3½
Australian	0	0	2½	0	0	3½
Mahogany, Cuba	0	0	4½	0	0	5½
St. Domingo, cargo average	0	0	4½	0	0	5½
Mexican ,, ...	0	0	4	0	0	4½
Tobasco ,, ...	0	0	4½	0	0	5½
Honduras ,, ...	0	0	4½	0	0	5½
Rose, Rio .....ton	8	0	0	11	0	0
Box, Turkey	5	0	0	12	0	0
Walnut, Italian .....foot	0	0	4½	0	0	6
METALS.						
IRON—Bar, Welsh, in London...ton	4	17	6	5	0	0
,, ,, at works in Wales ...	4	7	6	4	10	0
,, Staffordshire, in London ...	5	5	0	7	0	0
COPPER—						
British, cake and ingot..... ton	74	0	0	75	0	0
Best selected	75	0	0	76	0	0
Sheets, strong	80	0	0	0	0	0
Chili, bars	79	10	0	0	0	0
YELLOW METAL.....lb.	0	0	7½	0	0	7
LEAD—						
Pig, Spanish .....ton	12	15	0	13	0	0
English, common brands	13	2	6	13	5	0
Sheet, English.....	13	0	0	13	5	0
SPELTER—						
Silesian, special .....ton	16	7	6	16	15	0
Ordinary brands.....	16	0	0	16	2	6
TIN—						
Straits .....ton	89	0	0	0	0	0
Australian	89	0	0	0	0	0
English Ingots.....	94	10	0	0	0	0
ZINC—						
English sheet.....ton	18	10	0	19	0	0
OILS.	£.	s.	d.	£.	s.	d.
Linseed .....ton	18	0	0	0	0	0
Cocoanut, Cochin	24	10	0	27	0	0
Ceylon	22	0	0	0	0	0
Palm, Lagos	20	0	0	20	10	0
Rapeseed, English pale	24	5	0	0	0	0
,, brown	22	15	0	23	0	0
Cottonseed, refined	20	10	0	0	0	0
Tallow and Oleine	25	0	0	45	0	0
Lubricating, U.S.	5	15	0	6	0	0
,, refined	7	0	0	12	0	0
TURPENTINE—						
American, in casks.....cwt.	1	6	9	1	7	0
TAR—						
Stockholm .....barrel	0	15	9	0	0	0
Archangel	0	9	6	0	0	0

CONTRACTS AND PUBLIC APPOINTMENTS.

Epitome of Advertisements in this Number.

CONTRACTS.

Nature of Work, or Materials.	By whom required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.	Page.
New Sheds, Stores, &c.	Wandsworth Bd. of Wks	*Official*	July 31st	xiii.
Building Brick Wall, Fulham	Met. Board of Works...	do.	do.	xiii.
Kentish Flints and Hoggin	Mile End Vestry	J. M. Knight	August 1st	xiii.
Painting and other Works, Fulham	Met. Asylums Board ...	A. & C. Harston	do.	xiii.
Painting and Repairs	Stepney Union	do.	August 2nd	xiii.
Greenhouses & Pits, Offices, &c., Victoria Pk.	Met. Board of Works...	*Official*	do.	xiii.
Cast-Iron Water Mains, Hammersmith	do.	do.	do.	ii.
Granite Carriageways & York Stone Footways	do.	do.	August 3rd	ii.
Slop Vans	Paddington Vestry	do.	do.	xiii.
Wood Blocks for Paving	do.	do.	do.	xiii.
Thames Ballast, Sand, and Cement	do.	do.	do.	xiii.
Impounding Water Reservoir, &c.	Chelmsford Local Board	C. Pertwee	August 4th	xiii.
Painting Railings and Repairing Brick-Wall...	Lambeth Burial Board	*Official*	August 7th	xiv.
Supply of Water-Mains, and Laying same	Ely Local Board	do.	do.	xiii.
Road Making and Paving Works	Leyton Local Board	W. Dawson	do.	xiv.
New Flood Gates, &c.	Hertford Cor.	R. Austin	do.	ii.
Kerbing, Tarpaving, Metalling, &c., Works...	Lewisham Board of Wks	*Official*	do.	xiii.
Asphalte Paving and Wood-Block Crossings...	Bournemouth Com.	G. R. Andrews	August 8th	xiii.
Well-Sinking and Artesian Boring	Halstead Local Board...	Jabez Church	do.	xiv.
New Lighthouse at Southwold	Trinity House Cor.	E. Clark	August 9th	xiii.
Main Sewers	Leicester Corporation...	J. Gordon	do.	ii.
Alterations to Workhouse	St. Saviour's Union	Jarvis & Son	do.	xiii.
Infectious Diseases Hospital	Derby U.S.A.	R. J. Harrison	August 11th	ii.
Heating Apparatus	Folkestone Pleasure Gardens Co., Lim...	*Official*	August 17th	xiv.
Repairs to Roads, Dartford	Met. Asylums Board ...	A. & C. Harston	August 18th	xiii.
Painting and other Work, Dartford	do.	do.	do.	xiv.
Sewering and Making-good Roads	Hornsey Local Board...	T. De Courcy Meade ...	August 20th	xiii.
Painting, &c., Works, Bury St. Edmunds	War Department	*Official*	Not stated...	i.
Rebuilding Factory, Abingdon	W. B. Bailey	J. G. T. West	do.	xiv.
Limewhiting and Painting Works, Shrewsbury	War Department	*Official*	do.	xiii.
New Pulp Works	Barrow Chemical Wood Pulp Co., Limited ...	Maxwell & Tuke	do.	ii.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in.	Page.
Borough Surveyor	Sheffield Town Council	800*l.*	August 9th	xviii.
Junior Examiner, Office of Works	Civil Service Com.	Not stated	August 22nd	xviii.

TENDERS.

[Communications for insertion under this heading must reach us *not later than* 12 *Noon on Thursdays.*]

BANGOR (North Wales).—For erecting a pair of semi-detached villa residences, Bangor. Mr. John H. Phillips, architect, Cardiff:—

William Thomas	£2,450	0	0
W. & O. Pritchard	2,222	0	0
Robert Williams	2,187	0	0
R. & J. Williams	2,163	0	0
Evan Jones	2,000	0	0
Evan Williams	1,866	0	0
Lewis Parry, Bodffordd, Llangefni*	1,659	0	0

* Accepted.

BOSTON (Lincolnshire).—For the erection of a house and shop, for Mr. R. Donnison. Mr. J. Rowell, architect, Argyle-street, Boston:—

W. Greenfield, Boston	£500	0	0
J. Rossington, Boston	475	10	0
Enderby, Grimsby	445	5	6
Johnson Taylor, Boston	440	0	0
Ellis, Grimsby	436	0	0
H. W. Parker, bricklayer, W. & H. Hinds, carpenters, } Boston.	430	0	0
C. Jessop, Boston (accepted)	410	0	0

BROMLEY (Kent).—For the erection of a residence, lodge, and stabling, for Mr. A. Gurney Smith, at Bromley, Kent. Mr. H. Percy Monckton, architect, 32, Walbrook, E.C. Quantities by Messrs. Drower & Ruault, 17, Southampton-street, W.C.:—

Higgs & Hill	£3,990	0	0
D. Payne	3,895	0	0
Turtle & Appleton	3,800	0	0
Holliday & Greenwood	3,777	0	0
T. Crossley	3,751	0	0
Maides & Harper	3,686	0	0
W. J. Smith & Co.	3,669	0	0
J. Smith & Sons	3,655	0	0
W. Wiltshire	3,545	0	0
Taylor & Sons	3,540	0	0
E. A. Roome, Clarence-road, Lower Clapton (accepted)	3,479	0	0

BUSKETT FLETCHWOOD (Hants.).—For new conservatory, range of vineries and plant-houses, heating apparatus, &c., for Mr. Lawson Tait. Mr. R. H. Haseman, landscape gardener:—

Henry Hope, Birmingham (accepted)	£1,209	4	5

ENFIELD.—For the erection of new schools, Clay Hill, Mr. C. Stuart Robertson, architect:—

Field & Son, Ponders End	£444	0	0
A. Fairhead & Son, Enfield	438	0	0
L. & W. D. Patman, Enfield	428	0	0
John Brooks, Enfield (accepted)	425	0	0

EPWORTH.—For the new Wesley Memorial Chapel at Epworth. Mr. Charles Bell, architect, 3, Salters' Hall-court, Cannon-street, E.C. Quantities not supplied:—

Adams, Rotherham	£4,370	0	0
Perry, Sheffield	3,498	0	0
Baines, Newark	2,996	0	0
Thompson, Louth	2,900	0	0
Wright, Lincoln	2,800	0	0
Kelsey, Epworth*	2,749	0	0
Holmes & Horton, Wainfleet	2,745	0	0

* Accepted, Ancaster stone dressings and pitch pine for roofs and joinery being included.

FARNHAM.—For alterations to closets and drainage, National Schools, Farnham, Surrey. Mr. Sidney Stapley, architect:—

H. Patrick	£128	10	0
Tompsett & Kingham	120	0	0
Goddard & Sons	112	0	0
T. Diamond	108	0	0

FARNHAM.—For two houses and shops in South-street, Farnham, Surrey, for Mr. George Trimmer. Mr. Sidney Stapley, architect:—

Garland, Aldershot	£1,395	0	0
Patrick, Farnham	1,385	0	0
Tompsett & Kingham, Farnham	1,370	0	0
Hughes, Aldershot	1,248	0	0
Parratt, Farnham	1,228	0	0
Diamond, Farnham (accepted)	1,180	0	0

FRIERN BARNET.—For making-up of Friern Park-road, Finchley Park-road, Woodland-road, The Avenue, Homesdale-road, Stanhope-road, and Carlisle-place, for the Friern Barnet Local Board. Mr. George Clarke, surveyor:—

C. Killingback	£4,097	1	1
A. Kellett	4,014	19	5
J. Bloomfield	3,969	19	0
H. R. Trehearne	3,912	0	0
Nowell & Robson	3,872	0	0
Bradshaw & Co.	3,811	4	7
J. Pizzey	3,692	0	0
W. Nicholls	3,626	2	0
A. T. Catley	3,624	0	0
Geo. Bell	3,563	10	0
John Curnow	3,550	10	0
Mowlem & Co.	3,500	0	0
T. Adams	3,371	19	0
J. Smart (Tar paving only)	541	9	2

FULHAM.—For works for the Fulham Vestry, Mr. J. P. Norrington, surveyor:—

Hannel-road.

Neave & Son	£236	0	0
Nowell & Robson	233	0	0
Adams	225	0	0
Trehearne	225	0	0
Tomes & Wimpey	224	0	0
Coat	217	0	0
Mears (accepted)	206	0	0

Gliddon-road (Section 2).

Neave & Son	552	0	0
Adams	534	0	0
Trehearne	510	0	0
Nowell & Robson	499	0	0
Mears	489	0	0
Coat	466	0	0
Tomes & Wimpey (accepted)	460	0	0

Bothwell-road.

Neave & Son	206	0	0
Adams	195	0	0
Tomes & Wimpey	190	0	0
Nowell & Robson	190	0	0
Coat	187	0	0
Mears (accepted)	177	0	0
Trehearne	176	0	0

Totals for the Three Roads.

Neave & Son	994	0	0
Adams	954	0	0
Nowell & Robson	922	0	0
Trehearne	911	0	0
Tomes & Wimpey	874	0	0
Mears	872	0	0
Coat	870	0	0

GREENWICH.—For the enlargement of Greenwich Union Infirmary, for the Guardians. Mr. Thos. Dinwiddy, architect, Greenwich. Quantities by Mr. W. T. Farthing:—

Lascelles & Co., Bunhill-row	£24,687	0	0
Knight, Sidcup	24,307	0	0
Wallis & Son, Maidstone	24,150	0	0
Mowlem & Co., Westminster	23,900	0	0
Downs, Walworth-road	23,630	0	0
Rider & Son, Borough	23,530	0	0
Scholfield, Deptford	23,283	0	0
T. Martin, Maidenhead	23,000	0	0
J. Morter, Stratford	22,934	0	0
Deacon & Co., Lower Norwood	22,793	0	0
Bunning & Son, Camberwell	22,621	0	0
Stimpson, London	22,600	0	0
Killby & Gayford, Worship-street	22,582	0	0
Parker	22,479	0	0
Jerrard, Lewisham	22,467	0	0
Kirk & Randall, Woolwich	22,230	0	0
Balaam Bros., Old Kent-road	22,222	0	0
Brass & Son, St. Luke's, E.C.	21,182	0	0
Holloway, New Cross-road*	20,928	0	0

* Proposed corrected total.

HINCKLEY.—For the erection of three dwelling-houses, &c., in the London-road, Hinckley. Mr. J. Wells, architect, Hinckley:—

J. & W. Harrold, Hinckley	£1,353	0	0
T. Foxon, Hinckley	1,343	10	0
Farmer & Greaves, Hinckley	1,197	0	0
T. Shilton, Stoke Golding*	1,175	0	0

* Accepted.

LLANDUDNO JUNCTION (North Wales).—For erecting six cottages on the Glynymarl Estate. Mr. John H. Phillips, architect, Cardiff:—

John O. Hughes	£1,228	9	0
Thomas Jones	1,148	0	0
Henry Pritchard	1,096	0	0
David Evans	1,050	0	0
Berth Jones	1,000	0	0
Robert Pritchard	970	0	0
Edward Roberts	960	0	0
Evan Roberts	929	0	0
Hugh & John Jones	831	12	0
Edward Fowlkes, Colwyn Bay*	808	0	0

* Accepted.

LONDON.—For rebuilding Garden House, Mildmay Park, for Mr. J. E. Mathieson. Mr. R. H. Hill, architect:—

H. L. Holloway, Church-street, Deptford	£3,190	£95*	£3,095†

* Reduction if yellow deal is used in lieu of pitch pine.
† Accepted.

LONDON.—For repairs and alterations to Bethnal Green Congregational Church:—

A. Taylor	£520	0	0
G. W. Beale	506	0	0
B. Wire	430	0	0
Jackson & Todd	414	0	0
F. Higgs	386	0	0
W. M. Dabbs (accepted)	385	0	0

LONDON.—For the erection of bacon stoves and warehouse, stables, &c., at Smithfield Market, for Mr. F. L. Boyd. Mr. F. Warskitt, surveyor:—

Wm. Reason, 100, St. John-street, (accepted)	£720	0	0

[No competition].

LONDON.—For erecting offices, &c., in Tooley-street, S.E., for Mr. S. Taylor. Mr. Butterworth, architect:—

Perry	£1,250	0	0
Battley	947	0	0
H. & C. Castle	894	0	0
W. & F. Croaker	862	0	0
Geo. Parker, Peckham (accepted)	835	0	0

LONDON.—For alterations and additions to St. John's Hospital for Diseases of the Skin, Leicester Square, W.C. Mr. Edward Clark, architect, 432, West Strand, W.C.:—

J. Hocking	£275	0	0
T. L. Green	253	0	0
Patman & Fotheringham	235	0	0
Jackson & Todd	220	0	0
John Anley	209	0	0

LONDON.—For additions to warehouses for Messrs. List & Sons, Bunhill-row. Mr. Charles Bell, architect, 3, Salters' Hall-court, Cannon-street, E.C.:—

Allen & Sons	£975	0	0
Sharpe	910	0	0
Anley	890	0	0
Paine Bros. (accepted)	870	0	0

PADDINGTON.—For painting and other work at the Infirmary, Harrow-road, for the Guardians of Paddington. Messrs. A. & C. Harston, architects, 15, Leadenhall-street, E.C. Quantities not supplied:—

Dixon & Dowse	£510	7	6!
W. H. Lesser	380	0	0
Kirby & Chase	370	0	0
F. G. Pinn	364	8	0
T. Maling	345	10	0
P. H. Carder	310	0	0
G. Foxley	287	0	0
Stevenson & Co.	269	0	0
W. H. Handover, 307, Harrow-road, W. (accepted)	220	0	0!

READING.—For works in connexion with the restoration of the Church of the Holy Trinity. (First portion: reseating nave, &c.) Mr. George W. Webb, architect, Friar-street, Reading:—

Wheeler Bros., Reading (accepted)	£1,000	0	0

READING.—For erecting a Temperance refreshment house, Elm Park-road, for Mr. E. J. S. Jesse. Mr. George W. Webb, architect:—

Estates Workmen (accepted)	£650	0	0

READING.—For alterations to the New Inn, Oxford-road, for Mr. H. B. Blandy, J.P. Mr. Geo. W. Webb, architect:—

Strong Bros., Reading	£431	0	0
Goodchild, Reading	419	5	0
Margetts, Reading	396	0	0
Bottrill & Son, Reading	377	0	0
Searle, Reading	359	0	0
Winkworth, Reading	357	9	6
Lewis & Son, Reading (accepted)	353	0	0

READING.—For making a continuation of Elm Park-road, surface water and sewage drains, &c., for Mr. E. J. S. Jesse. Mr. George W. Webb, architect :—

W. Reeves, Reading (accepted)	£150 0 0

READING.—For block of forty-one cottages, Elm Park-road, for Messrs. E. J. S. Jesse. Mr. Geo. W. Webb, architect :—

Estates Workmen (accepted)	£5,330 0 0

SELHURST.—For the erection of a new school and parish room in connection with the Church of the Holy Trinity, Selhurst. Messrs. Burke-Downing & Phillips, architects, 26, Craven-street, Strand, W.C. Quantities not supplied.

G. E. Bryan, High-street, South Norwood	£1,695 0 0	A	£50 0 0
Smith & Bulled, Strathmore-road, Croydon	1,497 0 0		40 0 0
Maides & Harper, Cherry Orchard-road, Croydon	1,497 0 0		
Goulder & Glasscock, Croydon	1,455 0 0		94 0 0
M. Taylor, Southbridge-road, Croydon	1,448 0 0		77 0 0
J. Smith & Sons, Junction Works, S. Norwood	1,437 0 0		70 0 0

A.—For additional thickness in walls of parish room.

SEVENOAKS.—For the erection of St. John's Hall and Schools, Sevenoaks. Mr. R. H. Hill, architect, 3, Lombard-court, E.C. :—

E. Thurbon, Tunbridge Wells	£1,888 0 0
D. C. Jones & Co., Gloucester	1,888 0 0
W. A. Grubb, Bromley	1,840 0 0
J. W. Bunning & Son, Camberwell	1,759 0 0
H. L. Holloway, Deptford	1,699 0 0
G. H. Denne & Son, Deal†	1,690 0 0
J. Shillitoe & Son, Bury St. Edmunds	1,680 0 0
E. Abley & Co., Shepherd's Bush	1,665 0 0
H. Adams, Tunbridge Wells	1,660 0 0
R. A. Lowe, Chislehurst	1,593 0 0
R. Durtnell, Brasted	1,580 0 0
W. H. Canty, Tunbridge Wells	1,573 0 0
G. J. Kick, Beckenham	1,567 0 0
G. H. Lay, Bromley	1,561 0 0
W. Wiltshire, Sevenoaks*	1,555 0 0
G. Stephenson, Bishopsgate-street	1,545 0 0
R. Avard, Maidstone	1,527 0 0
W. M. Dabbs, Stamford Hill	1,527 0 0
G. J. Jones, Tonbridge	1,500 0 0
J. Hole, Sutton	1,487 0 0

* Accepted. † Too late.

TUNSTALL (Staffordshire).—For the erection of a group of Jubilee Buildings, comprising School of Art and Free Library, public baths, fire-engine station, stabling, town yard, &c., for the Tunstall Local Board of Health. Quantities supplied. Mr. A. R. Wood, architect and surveyor, Tunstall :—

Contract No. 1.—School of Art and Free Library.

C. Smith, Tunstall	£4,600 0 0
Cooper & Jones, Tunstall	4,567 0 0
Bradney & Co., Wolverhampton	4,500 0 0
W. Cooke, Burslem	4,486 0 0
C. Cope, Tunstall	4,448 0 0
J. Bowden, Burslem	4,145 0 0
T. Goodwin, Tunstall	4,135 0 0
W. Walkerdine, Derby	4,100 0 0
J. Grosvenor, Tunstall (accepted)	4,000 0 0

Contract No. 2.—Public Baths and Fire-Engine Station.

Cooper & Jones, Tunstall	£4,560 0 0
W. Cooke, Burslem	4,412 0 0
J. Grosvenor, Tunstall	4,350 0 0
Bradney & Co., Wolverhampton	4,180 0 0
J. Bowden, Burslem	4,080 0 0
C. Cope, Tunstall	3,995 0 0
T. Goodwin, Tunstall (accepted)	3,890 0 0
W. Walkerdine, Derby	3,870 0 0
C. Smith, Tunstall	3,400 0 0

Contract No. 3.—Stabling, Town Yard, &c.

C. Smith, Tunstall	£1,160 0 0
Bradney & Co., Wolverhampton	1,115 0 0
J. Grosvenor, Tunstall	1,105 0 0
W. Cooke, Burslem	1,087 0 0
W. Walkerdine, Derby	1,020 0 0
Cooper & Jones, Tunstall	1,010 0 0
J. Bowden, Burslem	950 0 0
C. Cope, Tunstall	947 0 0
T. Goodwin, Tunstall (accepted)	927 0 0

WATFORD (Herts).—For alterations and additions to Southfield House, Watford, Herts, for Mr. J. J. Smith. Mr. H. Percy Monckton, F.R.I.B.A., architect, 32, Walbrook, E.C. :—

G. & J. Waterman (accepted)	£346 0 0

WAREHAM.—For the erection of stables, coach-house, cow-stalls, covered yard, piggeries, &c., at Organford, Wareham, for Mr. James B. Dugdale, J.P. Mr. W. Watts Fookes, architect, Wareham :—

Knight & Baker (accepted at schedule of prices).

WAREHAM.—For new stables and alterations to the Cove Hotel, West Lulworth, Wareham, for Messrs. Henry J. Panton & Co. Mr. W. Watts Fookes, architect :—

A. Knight	£690 0 0
Reuben Hardy	660 0 0
John Beer (accepted)	620 0 0

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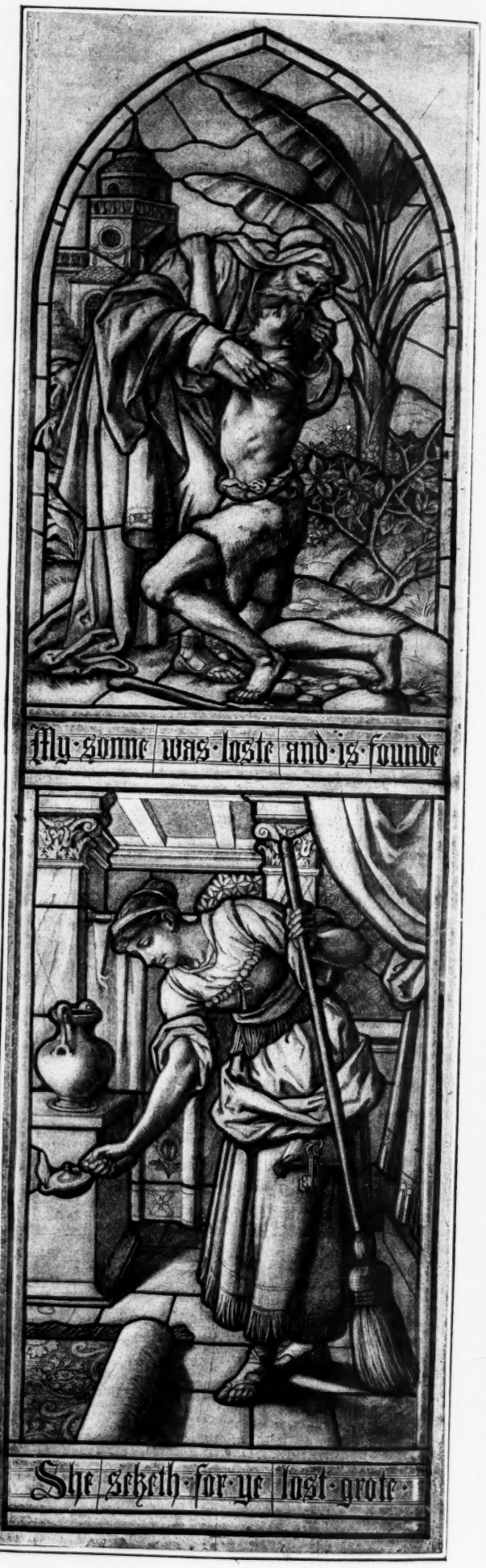

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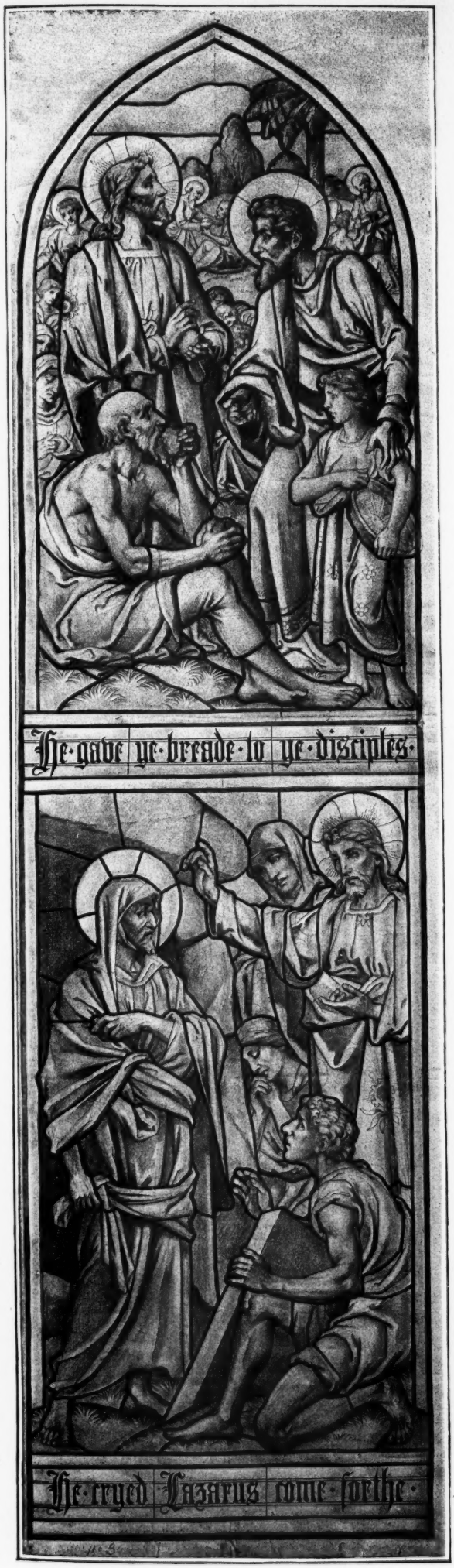

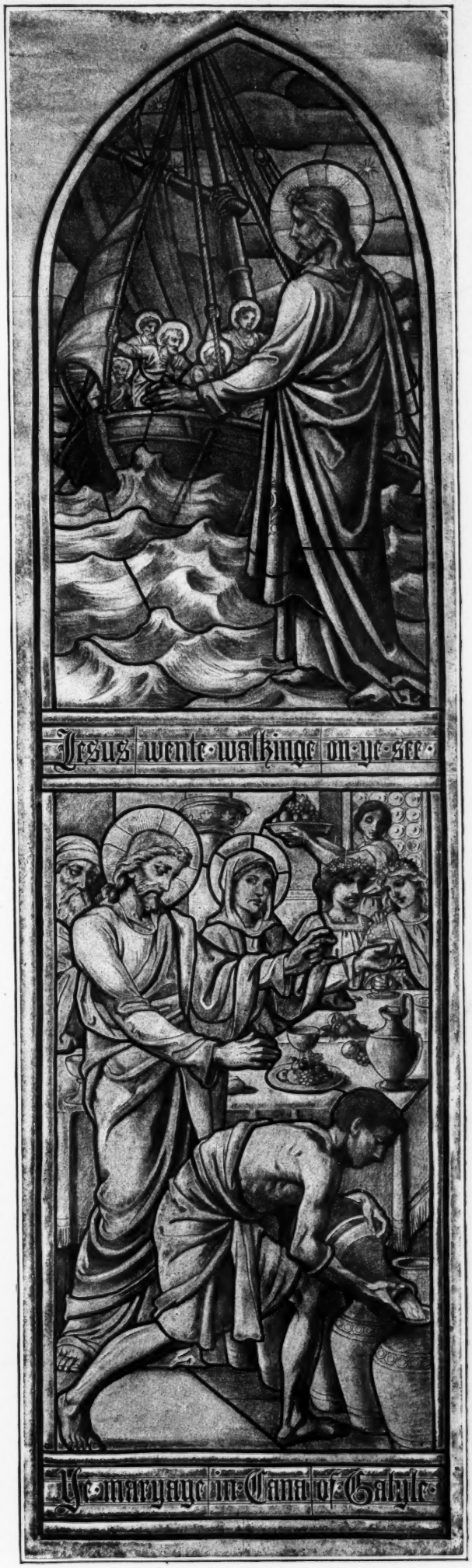

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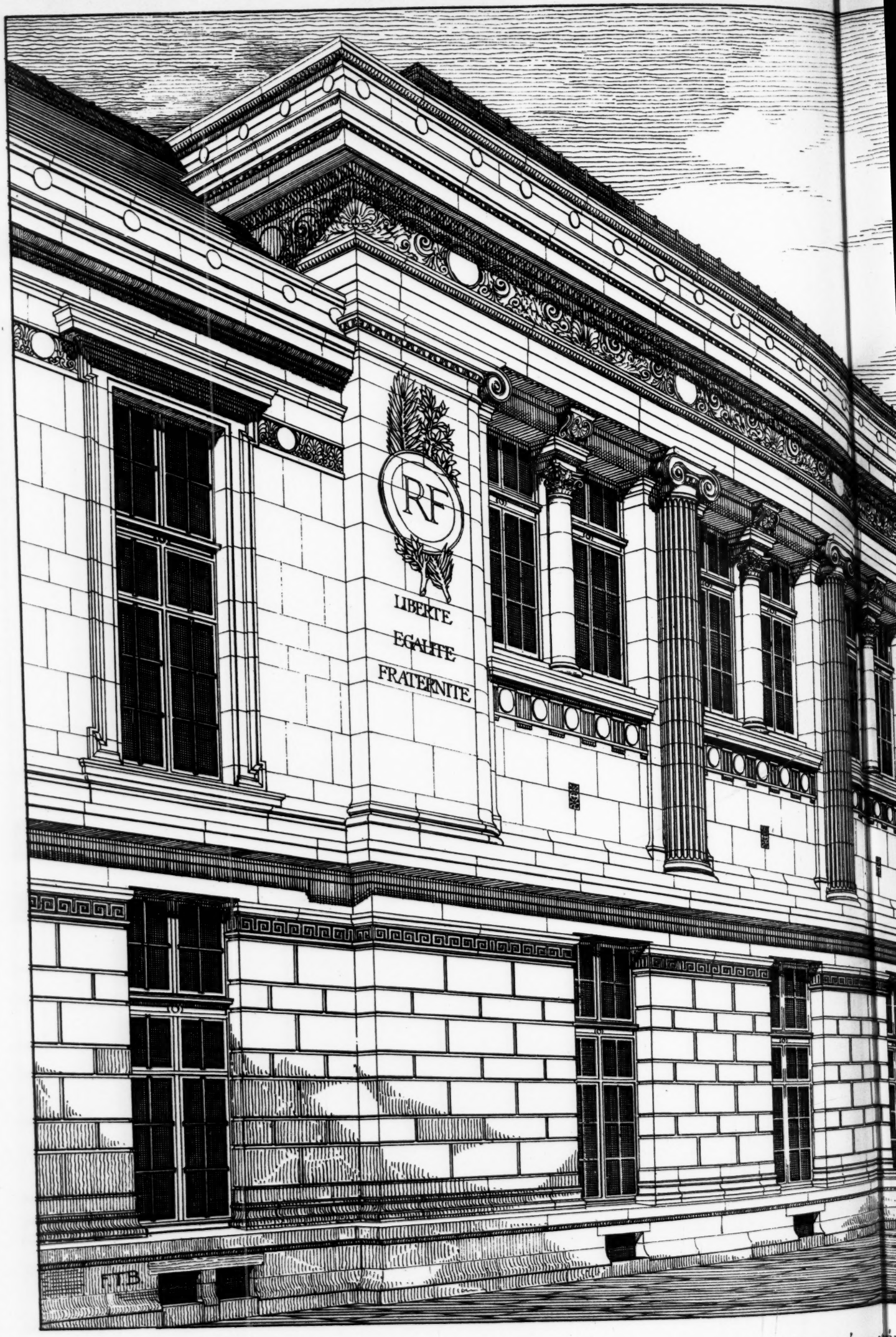

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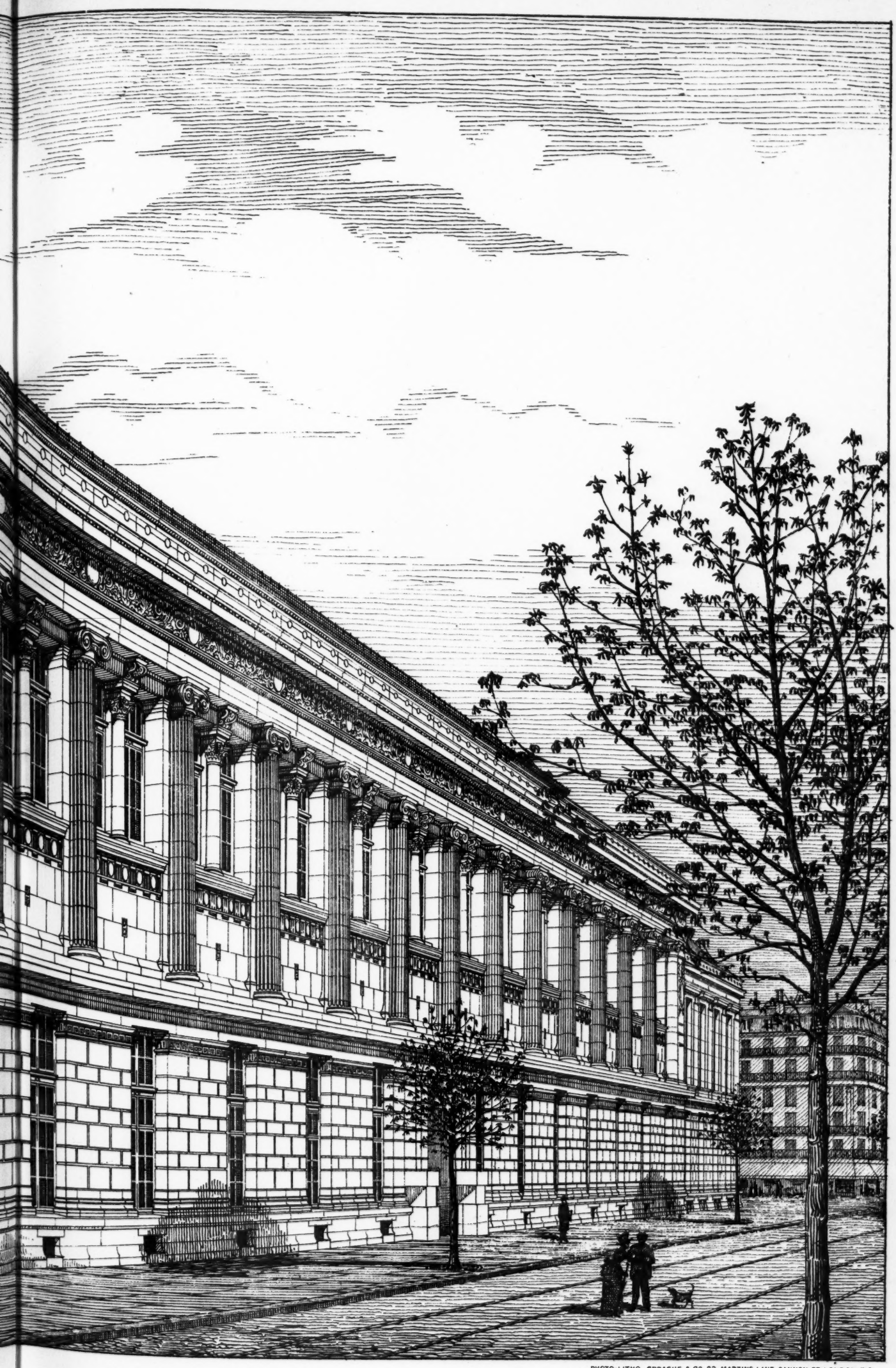

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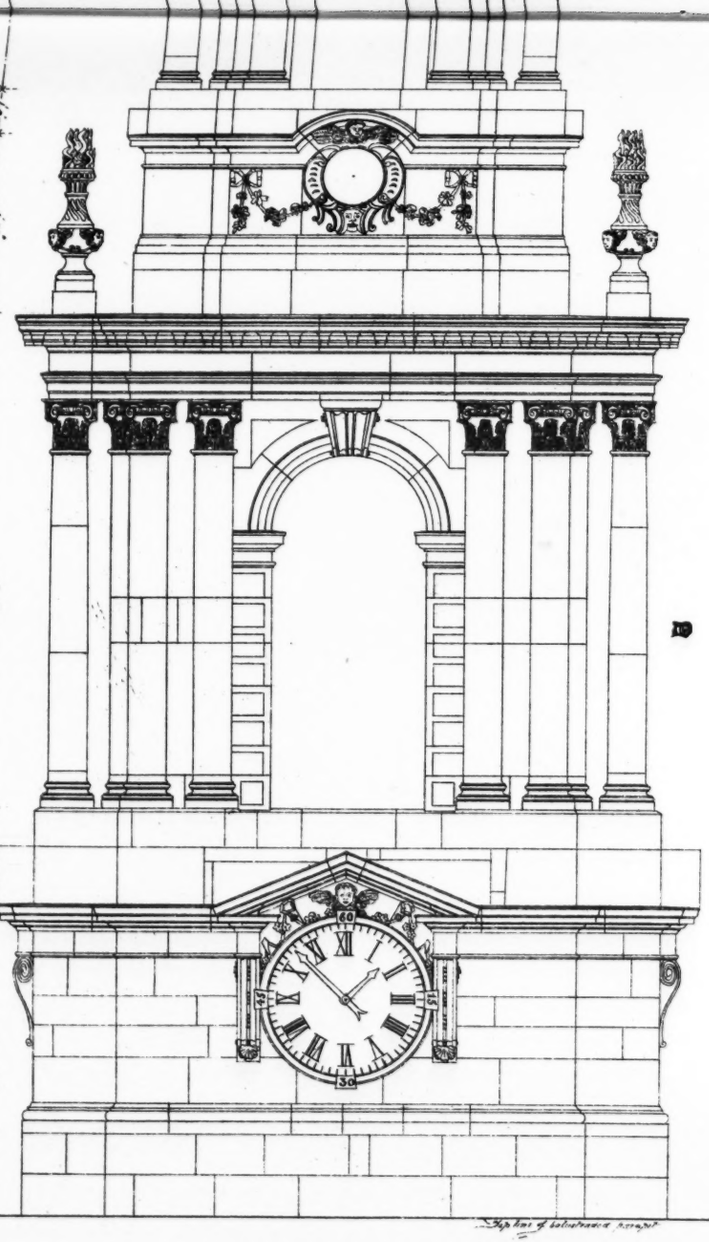
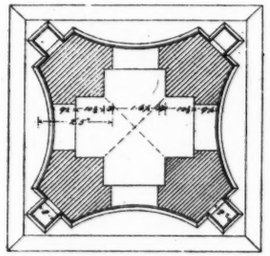
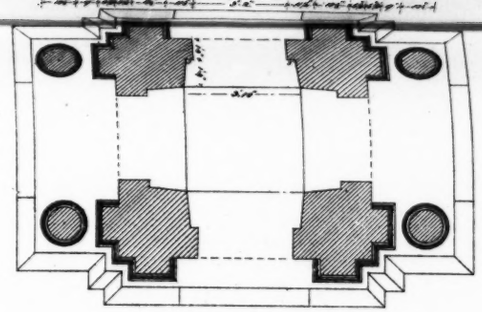


West Elevation

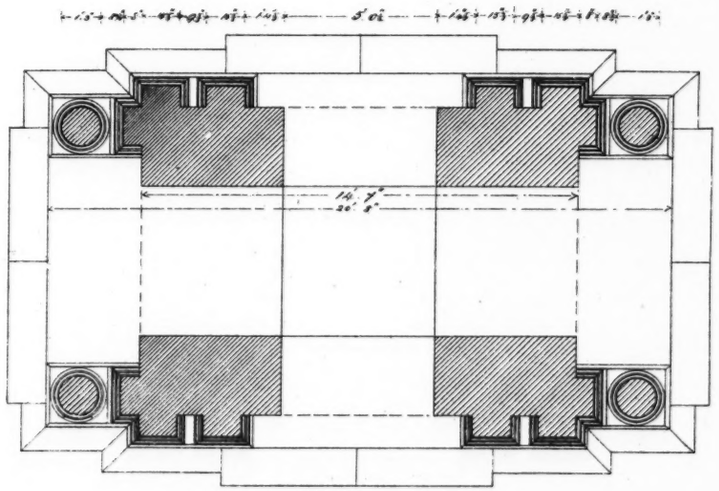
Plan A



Plan B



Plan C



Plan D

Scale

Note All Points have been carefully measured.

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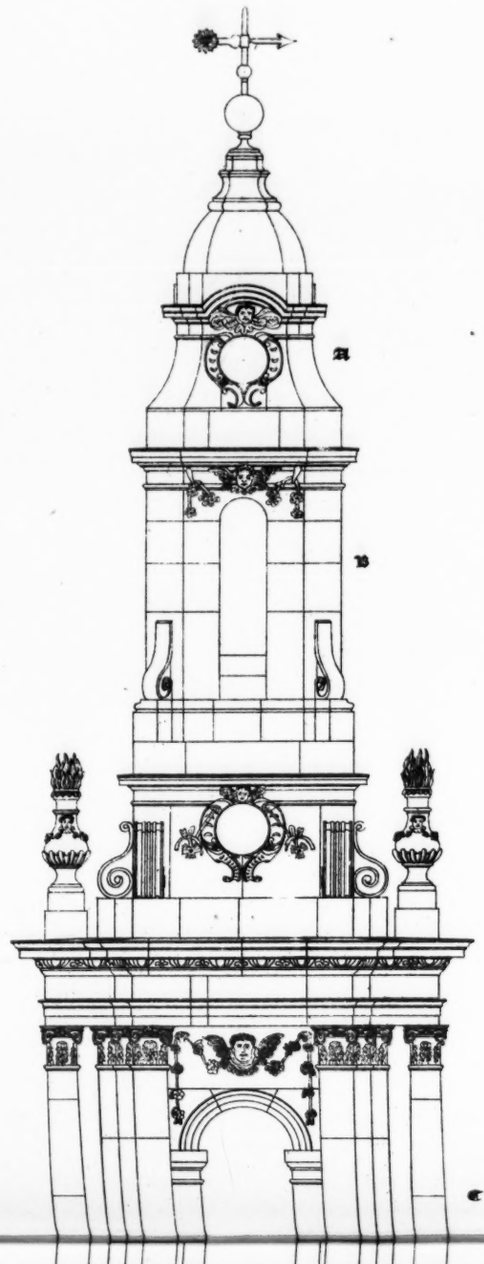
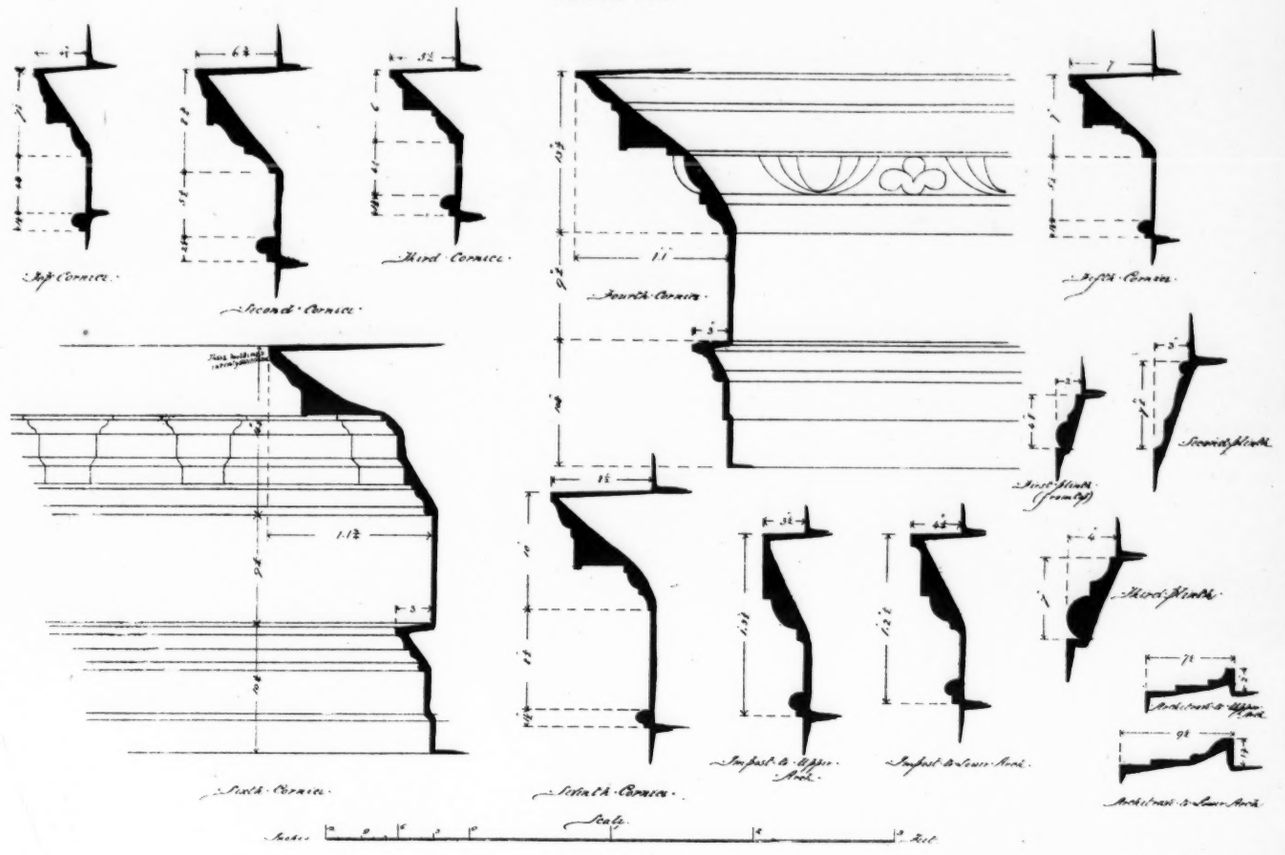
Church of S. Mary-le-Strand

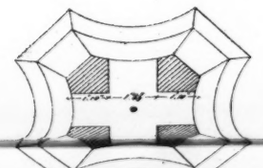
The Steeple

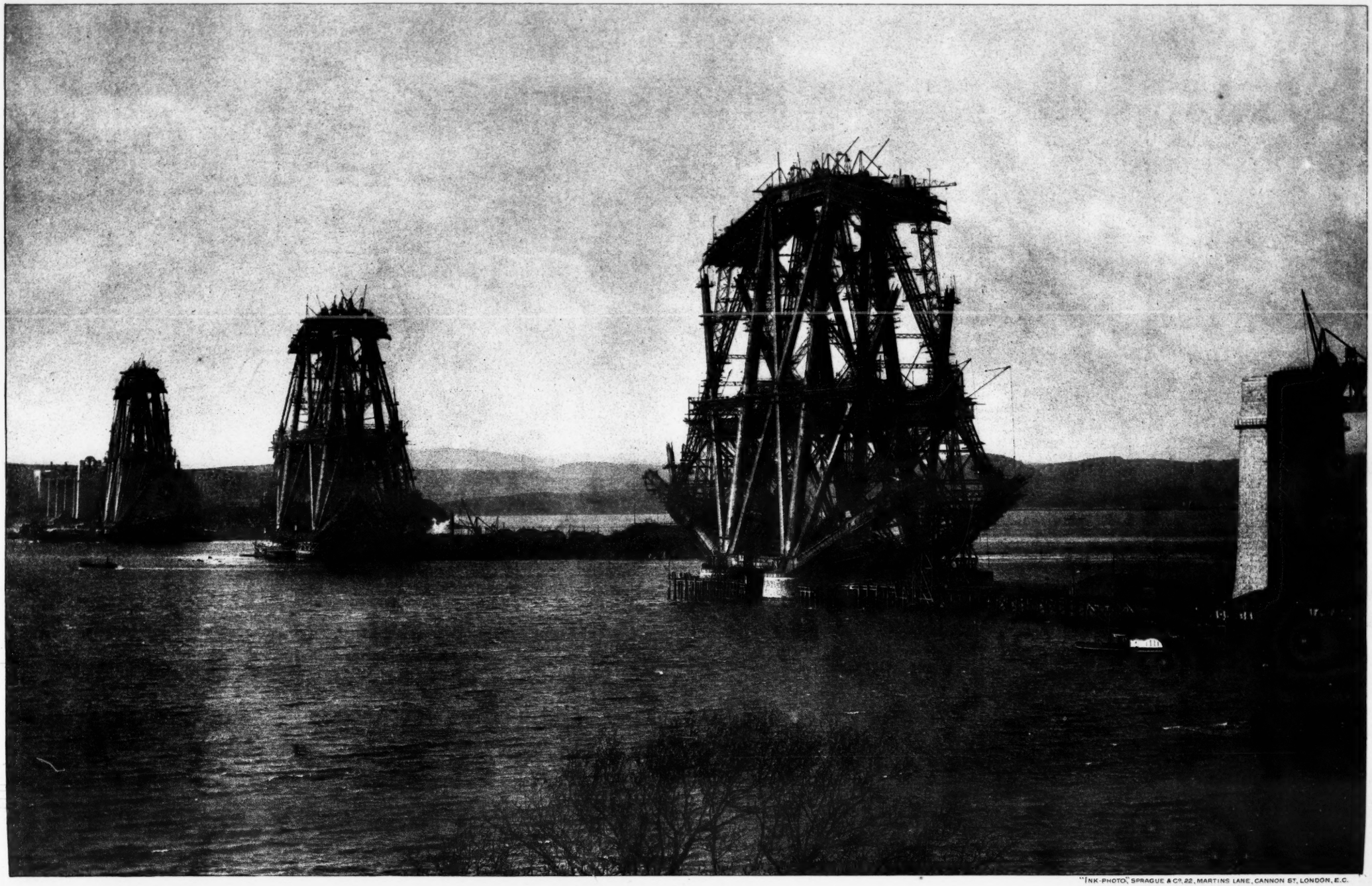
MENSURET DEL' APRIL 1888 } Thomas Cotterell, J. Hutchings.



Details







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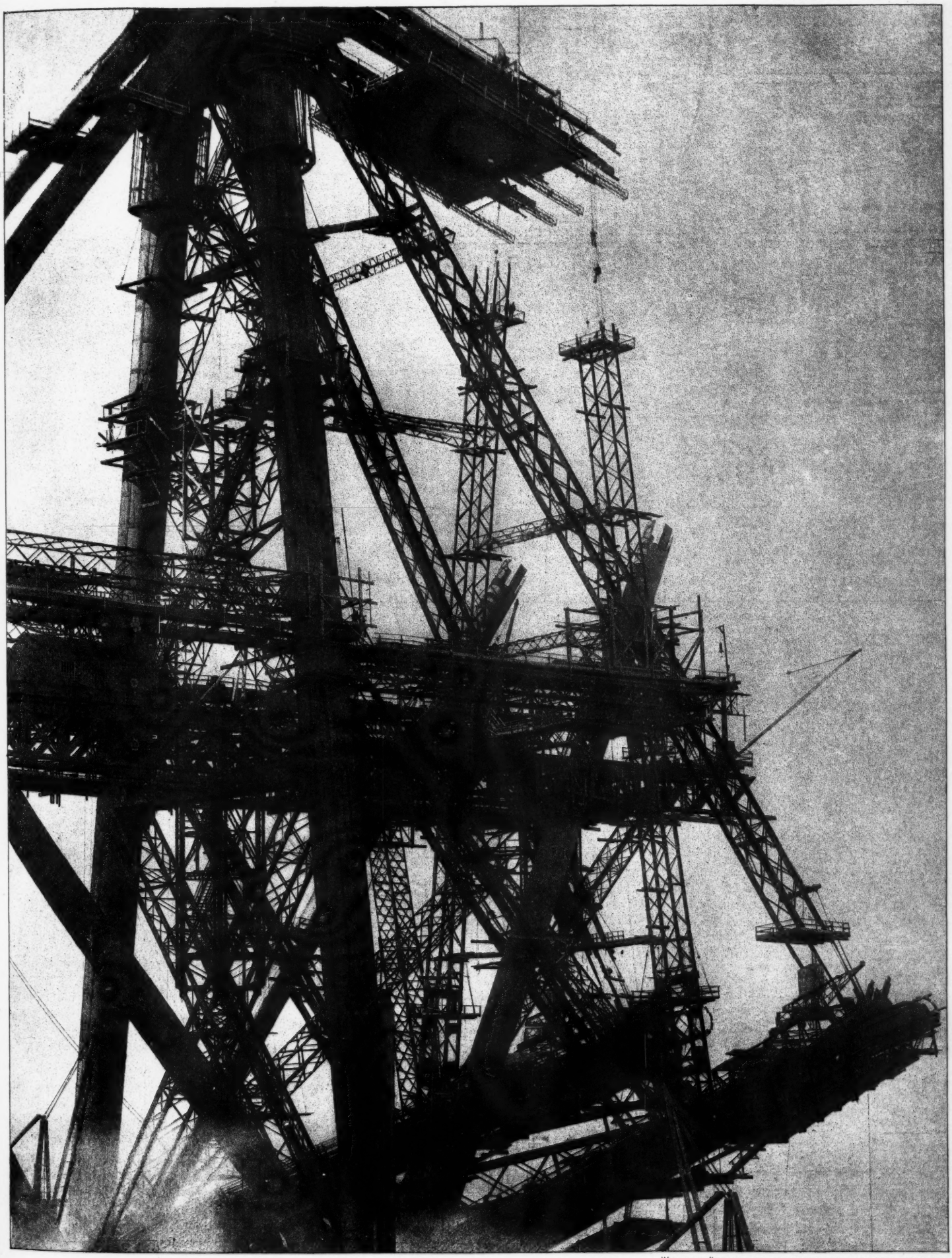

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